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Canada Centre for Mineral and Energy Technology | Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG0100 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

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Mine Evaluation Group

October 1982

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MINING RESEARCH LABORATORIES
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PROGRAM MEG0100 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG0100 is to identify economical intersections along a drillhole according to specified economical, mining and geological criteria and to calculate their average grade and projected thickness. These economical intersections will specifically be found using criteria such as: a cut-off grade, a minimum mining thickness width, a minimum waste thickness and a maximum dilution thickness which are the main options of this program.

The essential characteristic of the program methodology is to consider each drillhole separatly from the others when applying various criteria. The programs will select the best economical intersections along a drillhole according to the above mentioned criteria in order to maximize the total net metal quantity.

The input file of MEG0100 is provided by MEG1000 or MEG1600. The results provided by MEG0100 can be used to evaluate reserves by conventional, sectional and polygonal methods or by any methods using two dimensional variables. The output file of MEG0100 will be specifically used by programs MEG2010 and MEG3000.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG0100
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG0100 est d'identifier les intersections économiques le long d'un sondage en utilisant des critères économiques, miniers et géologiques, et de calculer la teneur moyenne ainsi que l'épaisseur projetée. Les intersections économiques sont spécifiquement définies à l'aide de critères tels que: une teneur de coupure, une épaisseur d'excavation minimum, une épaisseur minimum de roche stérile entre deux portions économiques et une épaisseur maximum de dilution. Les critères sont parmi les options principales de ce programme.

La méthodologie du programme se caractérise du fait que chaque sondage est traité séparément des autres. Ce programme choisira les meilleures intersections économiques le long d'un sondage en fonction des critères mentionnés ci-dessus de façon à maximiser la quantité nette de métal pour chaque intersection économique.

Le fichier d'entrée de MEG0100 est donné par MEG1000 ou MEG1600. Les résultats produits par MEG0100 peuvent être utilisés pour évaluer les réserves selon les méthodes conventionnelles de sections et de polygones ou par toute méthode utilisant des variables bi-dimensionnelles. Le fichier de sortie de MEG0100 sera spécifiquement utilisé par MEG2010 et MEG3000.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG0100(ICEP,DSAMPL,DSM,DDIPI,DAZIMI,DRC,DRT,SMO,
     -                   DCOREC,DAM,DCM,ICMO,GRAND,MTXPTR,MTXLIM,POLY,
     -                   CEP,AMETEP,DDFC,DELEV,DALOS,DTLOS,DRDFNS,
     -                   DGRADE,TMO,DMO,AMETMO,DISDENE,ACMETE,DIST,DENS,
     -                   ACMET,DDIP,DAZIM,DDEPT,DLATIT,EAMETEP,DIST1,
     -                   K6,K7,K8,K9,K10,EPCNT,MOPTR,IECMO)
C*
C*
C*****************************************************************
C*                                                               *
C******GENERAL DESCRIPTION                                       *
C*                                                               *
C*     THE PURPOSE OF THIS PROGRAM (MEG0100) IS TO IDENTIFY ECONOMICAL *
C*     INTERSECTIONS (E.I.) (COMPOSITE) OF A DRILL-HOLE ACCORDING TO *
C*     SPECIFIED ECONOMICAL, MINING AND GEOLOGICAL CRITERIA AND TO *
C*     CALCULATE FOR EACH INTERSECTION ITS AVERAGE GRADE AND PROJECTED *
C*     THICKNESS. THIS PROGRAM READS DRILLHOLE DATA FROM MEG1000 OR *
C*     MEG1600 OUTPUT FILE AND FOR EACH DRILL-HOLE WITHIN SPECIFIED *
C*     MINERALIZED ZONES, FINDS ECONOMICAL INTERSECTIONS BASED ON A *
C*     U3O8 CUT-OFF GRADE, A MINIMUM MINING WIDTH, A MINIMUM WASTE *
C*     THICKNESS AND A MAXIMUM DILUTION THICKNESS. THE PROGRAM *
C*     DETERMINES WHICH OF THE ECONOMICAL PORTIONS IS MINEABLE *
C*     (DEPENDING ON MINIMUM WASTE THICKNESS) AND OPTIONALLY SPLITS *
C*     ECONOMICAL AND MINED OUT PORTIONS INTO TOP-CUT AND BENCH-CUT *
C*     PROCESSES ONLY THE DRILL-HOLES FOUND INSIDE A SPECIFIED POLYGON,*
C*     OR SUPPRESSES PRINT-OUT LISTING.                          *
C*     THE PROGRAM READS DRILL-HOLE DATA FROM THE UNFORMATED FILE *
C*     INDATA (TAPE3) PREPARED BY PROGRAM MEG1000 OR MEG1600. THE *
C*     PROGRAM STORES ON OUTPUT FILE OTDATA (TAPE5) THE FOLLOWING *
C*     INFORMATION FOR EVERY DILUTED, ECONOMICAL AND MINED-OUT PORTION *
C*     AS WELL AS TOP-CUT AND BENCH-CUT: THE DRILL-HOLE IDENTIFICATION,*
C*     COORDINATES OF THE TOP, BOTTOM AND MID-POINT OF THE APPARENT *
C*     (ALONG THE HOLE) AND PROJECTED INTERSECTION, AVG. DENSITY, *
C*     GRADES METAL AND TONNAGE FOR URANIUM, THORIUM AND A MAXIMUM *
C*     OF FIVE OTHER METALS. THIS PROGRAM HAS BEEN WRITTEN IN CDC *
C*     FORTRAN LEVEL 4.8 AND WAS ORIGINALLY CREATED BY RAYMOND SABOURIN*
C*     (EMR,CANMET, MRL), MAY 1982.                              *
C*                                                               *
C*****************************************************************
C*                                                               *
C*****************************************************************
C*                                                               *
C******OPTIONS READ ON INPUT                                     *
C*                                                               *
C*     CARD 1 -PSER,PREEF(5),PTYPE,PRINT,PCUTOFF,PMINWTH,PTONFCT,PDL, *
C*             PBACK,PTOP,PPOLYG                                 *
C*             FORMAT READ IS (6R3,2R1,6F5.0,I2)                 *
C*        PSER   -MEG SERIES CODE                                *
C*        PREEF  -MEG REEF CODE, A MAXIMUM OF 5 REEFS CAN BE CHOSEN *
C*                (PREEF(I),I=1,5),THE PROGRAM WILL DO CALCULATIONS ONLY*
C*                 WITHIN THOSE REEFS, BY DEFAULT (BLANK), OR IF "ALL" *
C*                 CODED, ALL REEFS WILL BE ANALYSED              *
C*        PTYPE  -TYPE OF PROJECTED THICKNESS: MUST BE THE SAME AS IN *
C*                 MEG1000.                                      *
C*                 A-APPARENT                                    *
C*                 H-HORIZONTAL                                  *
C*                 T-TRUE                                        *
```

```
C*                V=VERTICAL(DEFAULT VALUE)
C*        PPRINT -OPTION TO ELIMINATE THE PRINTING OF THE OUTPUT.
C*                (N MUST BE ENTERED TO SUPPRESS PRINTING)
C*        PCUTOFF-CUT-OFF GRADE FOR U3O8
C*        PMINWTH-MINIMUM MINING WIDTH;IT IS THE MINIMUM THICKNESS FOR
C*                A PROJECTED THICKNESS OF AN ECONOMICAL INTERSECTION
C*        PTONFCT-AVERAGE TONNAGE FACTOR OF THE DEPOSIT
C*        PDL    -MAXIMUM DILUTION THICKNESS (OPTIONAL); THE MAXIMUM
C*                PROJECTED THICKNESS THAT COULD BE ADDED TO BOTH ENDS
C*                OF THE E. I.
C*        PBACK  -MINIMUM WASTE THICKNESS (OPTIONAL); IS THE MINIMUM
C*                PROJECTED THICKNESS BETWEEN TWO E.I. (THE MIN.
C*                DISTANCE BETWEEN TWO STOPES)
C*                IT IS ALSO THE MAXIMUM THICKNESS OF ONE OR SEVERAL
C*                ADJACENT NEGATIVE SEGMENTS WHICH CAN BE GROUPED WITH
C*                POSITIVE SEGMENTS TO FORM AN ECONOMICAL INTERSECTION.
C*                WHEN PBACK=0. THE OPTION IS NOT USED AND THERE IS NO
C*                MINIMUM WASTE THICKNESS. IN THIS CASE NO RESTRICTION
C*                IS IMPOSED ON THE THICKNESS OF NEGATIVE GROUPS OF
C*                SEGMENTS IN THE PROCESS OF CREATING AN ECONOMICAL
C*                INTERSECTION.
C*                TO OPTIMIZE THE AMOUNT OF NET METAL OF THE SELECTED
C*                ECONOMICAL INTERSECTIONS. IT IS RECOMMANDED TO ALWAYS
C*                SELECT A VALUE FOR PBACK. IF YOU DO NOT KNOW WHAT
C*                VALUE TO CHOOSE, SELECT PBACK LESS THAN OR EQUAL TO
C*                PMINWTH.
C*                THIS OPTION IS USED WITH A SELECTIVE MINING METHOD.
C*        PTOP   -TOP CUT THICKNESS (OPTIONAL); DIVIDES EACH E.I. INTO
C*                TOP CUT AND BENCH CUT
C*        PPOLYG -THE NUMBER OF POLYGON CORNERS TO FOLLOW; THE REGION
C*                CONFINED THEREIN WILL BE CHOSEN FOR ANALYSIS
C*     CARD(1+PPOLYG)-    (POLY(I),POLY(I+1),I=1,PPOLYG)
C*           FORMAT READ IS (2F10.0)
C*        POLY(I)-THE X COORDINATE OF THE ITH CORNER
C*        POLY(I+1)- THE Y COORDINATE OF THE ITH CORNER
C*                THE CORNERS MUST BE ENTERED CLOCKWISE
C*
C*****************************************************************************
C*
C*
C*****************************************************************************
C*
C******VARIABLE NAMES
C*
C*     ICEP   - ARRAY GIVING THE TYPE OF E.I. AND END OF EACH E.I.
C*     DSAMPL - ARRAY GIVING THE SAMPLE NUMBER OF SEGMENTS.
C*     DSM    - ARRAY GIVING THE SAMPLING METHOD OF SEGMENTS
C*     DDIPI  - ARRAY GIVING THE DIP (DEGREES) OF SEGMENTS
C*     DAZIMI - ARRAY GIVING THE AZIMUTH (DEGREES) OF SEGMENTS
C*     DRC    - ARRAY GIVING THE ZONE CODE OF SEGMENTS
C*     DRT    - ARRAY GIVING THE ROCK CODE OF SEGMENTS
C*     SMO    - ARRAY GIVING THE MINED-OUT SEGMENTS
C*     DCOREC - ARRAY GIVING THE % CORE RECOVERY OF SEGMENTS
C*     DAM    - MATRIX GIVING THE ASSAYING METHOD OF U3O8, THO2 AND
C*              FIVE METALS FOR EACH SEGMENT.
C*     DCM      MATRIX GIVING THE COMPUTING METHOD OF U3O8, THO2 AND
C*              FIVE METALS FOR EACH SEGMENT
```

```
C*      DDFC   - ARRAY GIVING THE DISTANCE FROM COLLAR OF SEGMENTS      *
C*      DELEV  - ARRAY GIVING THE ELEVATION OF BEGINNING OF SEGMENTS    *
C*      DALOS  - ARRAY GIVING THE APPARENT  LENGTH OF SEGMENTS          *
C*      DTLOS  - ARRAY GIVING THE PROJECTED LENGTH OF SEGMENTS          *
C*      DRDENS - ARRAY GIVING THE DENSITY OF SEGMENTS                   *
C*      DGRADE - MATRIX GIVING THE GRADES OF U308, THO2 AND 5 METALS    *
C*               FOR EACH SEGMENT                                       *
C*      DDIP   - ARRAY GIVING THE DIP (RADIANS) OF SEGMENTS            *
C*      DAZIM  - ARRAY GIVING THE AZIMUTH (RADIANS) OF SEGMENTS        *
C*      DDEPT  - ARRAY GIVING THE DEPARTURE OF BEGINNING OF SEGMENTS   *
C*      DLATIT - ARRAY GIVING THE LATITUDE OF BEGINNING OF SEGMENTS    *
C*      POLY   - ARRAY CONTAINING THE COORDINATES (DEPT.(X),LATIT.(Y)) *
C*               OF VERTICES (CORNERS) OF POLYGONE                     *
C*               POLY(1)= X COORDINATE (DEPT.) OF FIRST VERTEX         *
C*               POLY(2)= Y COORDINATE (LATIT.) OF FIRST VERTEX        *
C*      MTXLIM - ARRAY CONTAINING NUMBERS INDICATING THE PROCESSED OR  *
C*               UNPROCESSED SINGLE POSITIVE INTERSECTION              *
C*      MTXPTR - ARRAY CONTAINING THE IDENTIFICATION OF A + OR -       *
C*               INTERSECTION                                          *
C*      ICEP   - MATRIX GIVING THE TYPE OF E.I.THE END AND THE BEGINNING*
C*               OF EACH E.I.                                          *
C*      EPCNT  - NUMBER OF E.I. WHICH HAVE BEEN FOUND                  *
C*                                                                     *
C***********************************************************************
C*                                                                     *
C******VARIABLE DIMENSIONS                                            *
C*                                                                     *
C*      K10MAXIMUM NUMBER OF POLYGON CORNERS TIMES 2.                  *
C*      K9 MAXIMUM NO OF SEGMENTS PER DRILL-HOLE                       *
C*      K8 MAXIMUM NO OF EXPECTED ECONOMICAL INTERSECTIONS PER         *
C*         DRILL-HOLE (K8 MUST BE LESS THAN OR EQUAL TO K7(2)          *
C*      K7 MAXIMUM NO OF POSITIVE AND NEGATIVE GROUPS OF SEGMENTS PER  *
C*         DRILL-HOLE. (A POSITIVE AND NEGATIVE GROUP IS A GROUP OF    *
C*         ABOVE (BELOW) THE CUT-OFF GRADE )                           *
C*      K6 IS EQUAL TO K8+1                                            *
C*                                                                     *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                     *
C******FILES USED                                                     *
C*                                                                     *
C*      TAPE1  - INPUT PARAMETERS DATA CARDS                           *
C*      TAPE2  - OUTPUT DISPOSITION                                    *
C*               SECTION 1 - OPTIONS APPLIED                           *
C*               SECTION 2 - REPORT ABBREVIATIONS                      *
C*               SECTION 3 - RESULTS                                   *
C*      TAPE3  - INDATA INPUT DATA FROM UNFORMATED FILES MEG1000 OR    *
C*               MEG1600 (PFNI)                                        *
C*               READING STATEMENT (SEE RECORDING STATEMENT OF MEG1000 *
C*               OR MEG1600                                            *
C*      TAPE4  - POLYF LIST OF DRILL-HOLES WITHIN THE POLYGONE AREA    *
C*      TAPE5  - OTDATA DILUTED AND ECONOMICAL INTERSECTION RESULTS.   *
C*               THIS FILE IS FORMATED AND TO BE PASSED ON TO PROGRAMS *
C*               MEG3000, MEG2010, (PFNO)                              *
C*               RECORDING STATEMENT IS:                               *
```

```
C*                WRITE(5,907)ID1,ID2,IND(1),IREEF,TDEPT,TLATIT,TELEV,
C*               -TDP,TAZ,BDEPT,BLATIT,BELEV,BDP,BAZ,TPD,TPL,TPE,APD,
C*               -BPL,BPE,PMB,PML,PME,TDENS,THICK1,(METSUB(I),
C*               -TGRADE(I),TGROSS(I),I=1,7)
C*             907 FORMAT(1X,A1,I5,A2,3A3,3F10.1,2F10.4,5X,3F10.1,
C*                        2F10.4,/,18X,9F10.1,F10.4,F10.2,/,23X,
C*                        4(I5,2F10.3),/,23X,3(I5,2F10.3))
C*     TAPE6  = SAUPR, USED TO PRINT PART OF REPORT FOR OTHER METALS,
C*              ECONOMICAL PORTIONS TOTALS AND MINED OUT TOTALS
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******EXECUTION
C*
C*     H0100,CM125000,T200,IO400,P2.
C*     ACCOUNT,*****,PW=******.
C*     ATTACH,PROCD,MEGEXECCADD,ID = MEGPR,PW=****,MR=1.
C*     BEGIN,CADD,PROCD,PROGRAMIN=MEG0100.
C*     Q10 IS THE NUMBER OF POLYGONAL POINTS + 1.
C*     Q9  IS THE MAXIMUM NUMBER OF SEGMENTS PER DDH PLUS 2.
C*     Q8  IS THE MAXIMUM NUMBER OF EXPECTED ECONOMICAL INTERSECTION
C*         PER DDH Q8 = Q7/2.
C*     Q7  IS THE MAXIMUM NUMBER OF POSITIVE AND NEGATIVE GROUP OF
C*         SEGMENTS PER DDH. A POSITIVE (OR NEGATIVE) GROUP OF SEGMENTS
C*         IS A GROUP OF ADJACENT SEGMENTS HAVING A GRADE ABOVE (BELOW)
C*         THE CUT OFF GRADE.
C*     Q6  IS EQUAL TO Q8 + 1.
C*     PFNI = PERMANENT FILE NAME OF MEG0100 INPUT DATA FILE (TAPE3).
C*     PFNO = PERMANENT FILE NAME OF MEG0100 OUTPUT RESULTS (TAPE6).
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******DECLARATIONS
C*
C*****************************************************************
C*
C*
      INTEGER PSER,PPRINT,PPOLYG,TCONTI,TUDN,TCDN,TSIOD,TPCKM,TNSEG,
     -        TDIPI,TAZIMI,TYS,TMS,TDS,TYC,TMC,TDC,TDHSYMB,TC1SYMB,
     -        TC2SYMB,TCOMNT(7),PREEF(8),EOFLAG,ICEP(KA,5),FPCNT,PTYPE,
     -        METSYMB(20),METNAME(20,2),METSUB(7),DSAMPL(K9),DSM(K9),
     -        DDIPI(K9),DAZIMI(K9),DRC(K9),DRT(K9),SMO(K9),
     -        DCOREC(K9),DAM(K9,7),DCM(K9,7),ICMO(K8),GRAND(K8),
     -        MTXPTR(K9),ALLPTR,ECONPTR,MTXLIM(K8),TUDN1,TUDN2
     -        ,IECMO(KA)
      REAL POLY(K10),CEP(K8,6),AMETEP(K8,7),DDFC(K9),DELEV(K9),
     -     DALOS(K9),DTLOS(K9),DRDENS(K9),DGRADE(K9,7),TMO(KA),
     -     DMO(K8),AMETMO(K8,7),DISDENE(K8,K6),ACMETE(KA,K6),DIST(K7),
     -     DENS(K7),ACMET(K7),DDIP(K9),DAZIM(K9),DDEPT(K9),DLATIT(K9
     -     ),EAMETEP(K8,7),DIST1(K7)
C*
```

CHAPTER 2.0
BLANK OPTION CARD SHEET(S)

MEG0100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 1
NAME _____

CARD NO. 1

PSER	PREEF(I),I=1,5	PTYPE	PPRINT	PCUTOFF	PMINW	PTONFCT	POL	PBACK	PTOP	PPOLYG
1 — 3	4 — 6 7 — 9 10 — 12 13 — 15 16 — 18	19	20	21 —— 25	26 —— 30	31 —— 35	36 —— 40	41 —— 45	46 —— 50	51 52

FORMAT(6R3,2T1,6F5.0,I2)

CARD NO. 2 TO EOF

POLY(I)	POLY(I+1)
1 —— 10	11 —— 20

FORMAT(2F10.0)

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,CADD,PROCD,PROGRAMIN=MEG0100,
PFNI=                              ,(PERMANENT FILE NAME OF INPUT FILE (MEG1000 or
                                    MEG1600)).
PFNO=                              ,(PERMANENT FILE NAME OF OUTPUT FILE (MEG0100)).
Q10=     ,Q9=     ,Q8=     ,Q7=     ,Q6=     . (VARIABLES  DIMENSIONS)
```

CHAPTER 3.0
EXECUTION OF THE PROGRAM WITH TEST DATA

MEG0100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 10-09-82
PAGE 1 OF 1
NAME RS

CARD NO. 1

PSER	PREEF(I),I=1,5	PTYPE	PPRINT	PCUTOFF	PMINW	PTONFCT	POL	PBACK	PTOP	PPOLYG
1 — 3	4 — 6 7 — 9 10 — 12 13 — 15 16 — 18	19	20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50	51 52
ZZX	ALL	A		3.0	10.0	10.0	0.0	0.0	0.0	b

FORMAT(6R3,2T1,6F5.0,I2)

CARD NO. 2 TO EOF

POLY(I)	POLY(I+1)	FORMAT(2F10.0)
1 — 10	11 — 20	

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,CADD,PROCD,PROGRAMIN=MEG0100,
PFNI= MEG1000ZZX          ,(PERMANENT FILE NAME OF INPUT FILE (MEG1000 or
                           MEG1600)).
PFNO= MEG0100ZZX          ,(PERMANENT FILE NAME OF OUTPUT FILE (MEG0100)).
Q10= 1  ,Q9=200 ,Q8= 40  ,Q7= 80  ,Q6= 41  . (VARIABLES  DIMENSIONS)
```

```
PROGRAM GEM0100     73/74    OPT=1                          FTN 4.8.528        10/09/82  10.13.32        PAGE     1

                PROGRAM GEM0100(INPUT,OUTPUT,OTDATA,POLYF,INDATA,SAVPR,
               -                TAPE1=INPUT,TAPE2=OUTPUT,TAPE3=INDATA,TAPE4=POLYF,
               -                TAPE5=OTDATA,TAPE6=SAVPR)
                INTEGER ICEP(40,5),DSAMPL(200),DSM(200),DDIPI(200),DAZIMI(200),
               -        DRC(200),DRT(200),SMO(200),DCOREC(200),DAM(200,7),
               -        DRC(200),DRT(200),SMO(200),DCOREC(200),DAM(200,7),
               -        ICMO(40),GRAND(40),MTXPTR(200),MTXLIM(40),DCM(200,7),
               -       IECMO(40)
                REAL POLY(1),CEP(40,6),AMETEP(40,7),DDFC(200),DELEV(200),
               -     DTLOS(200),DRDENS(200),DGRADE(200,7),TMO(40),DMO(40),
               -    AMETMO(40,7),DISDENE(40,41),ACMETE(40,41),DIST(80),
               -     ACMET(80),DDIP(200),DAZIM(200),DDEPT(200),DLATIT(200),
               -     EAMETEP(40,7),DIST1(80),DALOS(200),DENS(80)
          C*     K10 IS THE NUMBER OF POLYGONAL POINTS +1
          C*     K9 IS THE MAXIMUM NUMBER OF SEGMENTS PER DDH PLUS 2
          C*     K8 IS THE MAXIMUM NUMBER OF EXPECTED ECONOMICAL INTERSECTIONS
          C*        PER DDH K8=K7/2
          C*     K7 IS THE MAXIMUM NUMBER OF POSITIVE AND NEGATIVE GROUP OF
          C*        SEGMENTS PER DDH. A POSITIVE (OR NEGATIVE) GROUP OF SEGMENTS
          C*        IS A GROUP OF ADJACENT SEGMENTS ABOVE (BELOW) THE CUT OFF
          C*        GRADE.
          C*     K6 IS EQUAL TO K8+1
                K10=1
                K9=200
                K8=40
                K7=80
                K6=K8+1
                IF(41.NE.K6) GO TO 10
                CALL MFG0100(ICEP,DSAMPL,DSM,DDIPI,DAZIMI,DRC,DRT,SMO,DCOREC,DAM,
               -             DCM,ICMO,GRAND,MTXPTR,MTXLIM,POLY,CEP,AMETEP,DDFC,
               -             DELEV,DALOS,DTLOS,DRDENS,DGRADE,TMO,DMO,AMETMO,
               -             DISDENE,ACMETE,DIST,DENS,ACMET,DDIP,DAZIM,DDEPT,
               -             DLATIT,EAMETEP,DIST1,K6,K7,K8,K9,K10,
               -             EPCNT,MOPTR,IECMO)
                STOP
          10    PRINT20
          20    FORMAT(*)*,"ERROR IN GIVEN DIMENSIONS"/* *,"VERIFY THAT 41=40+1")
                STOP
                END
```

OPTIONS CHOSEN

CARD	OPTION		DESCRIPTION
1	PSER	ZZX	MEG SERIES CODE
	PREEF(1)=	ALL	1ST MEG REEF CODE CALCULATIONS WILL BE PERFORMED ONLY WITHIN THESE REEFS
	PREEF(2)=		2ND MEG REEF CODE
	PREEF(3)=		3ND MEG REEF CODE
	PREEF(4)=		4TH MEG REEF CODE
	PREEF(5)=		5TH MEG REEF CODE IF ALL IS CODED OR BLANK,ALL REEF WILL BE ANALYZED
	PTYPF=	A	TYPE OF THICKNESS USED IN THE PROJECTIONS MUST BE THE SAME AS SPECIFIED IN MEG1000 A=APPARENT T=TRUE H=HORIZONTAL V=VERTICAL (BY DEFAULT)
	PPRINT=		OPTION TO ELIMINATE THE PRINTING OF THE OUTPUT N MUST BE ENTERED TO SUPPRESS PRINTING
	PCUTOFF=	3.00	CUT-OFF GRADE
	PMINWTH=	10.00	MINIMUM MINING WIDTH: IT IS THE MIN. THICKNESS FOR A PROJECTED THICKNESS OF AN E.I.
	PTONFCT=	10.00	AVERAGE TONNAGE FACTOR OF THE DEPOSIT
	PDL=	0.00	MAXIMUM DILUTION THICKNESS (OPTIONAL) THE LENGTH OF SEGMENTS THAT COULD BE ADDED TO BOTH ENDS OF THE E.I.
	PBACK=	0.00	MINIMUM WASTE THICKNESS (OPTIONAL) IT IS THE MINIMUM THICKNESS BETWEEN TWO E.I.
	PTOP=	0.00	TOP CUT THICKNESS(OPTIONAL): TO DIVIDE EACH E.I. INTO TOP CUT AND BENCH CUT
	PPOLYG=	0	THE NUMBER OF POLYGON VERTICES TO FOLLOW: THE REGION CONFINED THEREIN WILL BE CHOSEN FOR ANALYSIS

THE FOLLOWING ABBREVIATIONS ARE USED IN THIS REPORT

H.F.	HOST FORMATION
S M	SAMPLING METHOD - 0 - MISSING SEGMENT (GROUND CORE)
	1 - CHIP SAMPLE
	2 - CHANNEL SAMPLE
	3 - UNDERGROUND DIAMOND DRILL-HOLE
	4 - SURFACE DDH
	5 - PERCUSSION DRILL-HOLE
	6 - BLAST HOLE
	7 - SCANNER SAMPLE
	8 - UNKNOWN SAMPLING METHOD
	U - DUMMY SEGMENT INSERTED BY MEG
R C	REEF CODE
R T	ROCK TYPE CODE
A M	ASSAYING METHOD - 0 - METAL NOT ASSAYED
	A - RADIOMETRY ONLY OF CORE - SCANNING
	B - RADIOMETRY ONLY OF CORE - ASSAYING
	C - RADIOMETRY ONLY OF HOLE
	D - CHEMICAL ASSAY ONLY - FLUOROMETRY
	E - - COLORIMETRY
	F - - VOLUMETRY
	G - RADIOMETRIC SCAN OF CORE AND CHEMICAL ASSAY - FLUOROMETRY
	H - - COLORIMETRY
	I - - VOLUMETRY
	J - RADIOMETRIC ASSAY OF CORE AND CHEMICAL ASSAY - FLUOROMETRY
	K - - COLORIMETRY
	L - - VOLUMETRY
	M - RADIOMETRY OF HOLE AND CHEMICAL ASSAY OF CORE OR CUTTINGS - FLUOROMETRY
	N - - COLORIMETRY
	P - - VOLUMETRY
	Q - ESTIMATED ASSAY FROM REGRESSION ANALYSIS
	R - RADIOMETRY OF HOLE AND RADIOMETRIC SCAN OF CORE OR CUTTINGS
	S - RADIOMETRY OF HOLE AND RADIOMETRIC ASSAY OF CORE OR CUTTINGS
	T - GEOLOGIST<S ESTIMATE
	U - X-RAY ASSAY
	V - ATOMIC ABSORPTION (NOT URANIUM)
	W - DELAYED NEUTRON ACTIVATION
	X - UNKNOWN ASSAYING METHOD
C M	COMPUTATIONAL METHOD TO DETERMINE FINAL GRADE
	BLANK - METAL NOT ASSAYED, ZERO SUBSTITUTED
	A - ASSAYED CHEMICALLY OR BY X-RAY - GRADE RETAINED
	B - ASSAYED BY RADIOMETRY OF CORE - CODED GRADE RETAINED
	C - - RADIOMETRIC GRADE CONVERTED
	D - ASSAYED BY RADIOMETRY OF HOLE - CODED GRADE RETAINED
	E - - RADIOMETRIC GRADE CONVERTED
	F - CHEMICAL OR X-RAY ASSAY, SLUDGE INCLUDED IN COMPUTATION
	G - CHEMICAL OR X-RAY ASSAY, POOR CORE RECOVERY, NO SLUDGE
	H - RADIOMETRY OF CORE, POOR CORE RECOVERY - CODED GRADE RETAINED
	I - - RADIOMETRIC GRADE CONVERTED
	T - GRADE ESTIMATED BY GEOLOGIST
	U - GRADE ESTMATED BY MEG
	X - UNKNOWN ASSAYING METHOD - CODED GRADE RETAINED
	Z - INVALID ASSAYING METHOD CODE - POOR RELIABILITY
C G I	CUT-OFF GRADE INDICATOR - PLUS - ABOVE CUT-OFF GRADE
	MINUS - BELOW CUT-OFF GRADE
M O I	MINED OUT SEGMENT INDICATOR - M - MINED OUT
D I	DILUTED INTERSECTION INDICATOR - D - DILUTED
E I	ECONOMICS INDICATOR - BLANK - DOES NOT BELONG TO ANY ECONOMICAL PORTION
	1 - BELONGS TO UNDILUTED ECONOMICAL PORTION
	2 - BELONGS TO DILUTED ECONOMICAL PORTION

UNITS (IMPERIAL OR METRIC)

VARIABLE	IMPERIAL	METRIC
DEPARTURE	FEET	METERS
LATITUDE	FEET	METERS
ELEVATION	FEET	METERS
HOLE LENGTH	FEET	METERS
DIPS AND AZIMUTHS	DEGREES	DEGREES
HOLE DIAMETER	INCHES	CENTIMETERS
CASSING	FEET	METERS
DRILLING STARTED	YS/MS/DS	YS/MS/DS
DRILLING COMPLTED	YC/MC/DC	YC/MC/DC
U3O8 CUT-OFF GRADE	LB/TON	KG/TONNE
MIN. MINING WIDTH	FEET	METERS
MIN. WASTE THICKNESS	FEET	METERS
MAX. DIL. WIDTH	FEET	METERS
TOP CUT WIDTH	FEET	METERS
DISTANCES	FEET	METERS
GRADE	LB/TON	KG/TONNE
U3O8 AVG. DIL	LB/TON	KG/TONNE
U3O8 GRADE MINED	LB/TON	KG/TONNE
TONNAGE FACTOR	CU.FT./TON	CU.M./TONNE
- GROSS DIL.EA	TON/FT.SQ.	TONNE/M.SQ.
- GROSS MINED	TON/FT.SQ.	TONNE/M.SQ.
- NET DIL.	TON/FT.SQ.	TONNE/M.SQ.
- NET MINED	TON/FT.SQ.	TONNE/M.SQ.
THICKNESS DIL.	FEET	METERS
THICKNESS MINED	FEET	METERS

R0100 A N A L Y S I S O F D R I L L - H O L E D A T A 10/09/82 MEG DRILL-HOLE NUMBER ZZX0009 PAGE 1

		DEPARTURE	19720.00	DDH TYPE	BWG	U3O8 CUT-OFF GRADE	3.00
COMPANY DRILL HOLE NUMBER	X15	LATITUDE	2590.00	HOLE DIAMETER (INCHES)	2.360	MIN. MINING WIDTH	10.00
SPECIAL DRILL-HOLE IDENT.		COLLAR ELEVATION	1152.00	INITIAL CASING TYPE	BW	MIN. WASTE THICKNESS	0.00
DRILLING STARTED	12/09/59	HOLE LENGTH	1935.00	INITIAL CASING LENGTH	20.00	MAX. DIL. WIDTH	0.00
DRILLING COMPLETED	09/12/59	DIP OF HOST FORMATION	-57	FINAL CASING TYPE		TOP CUT WIDTH	0.00
		AZIMUTH OF DIP OF H.F.	255	FINAL CASING LENGTH	0.00	ZONE(S) ALL	
LOCATION SURFACE HOLE				NUMBER OF SEGMENTS	48		

SAMPLE NUMBER	S W	DIST. FROM COLLAR	SEGMENT THICKNESS APPAR.	SEGMENT APPAR.	SEGMENT DIP	SEGMENT AZI.	R C	R T	PERC. CORE REC.	A M	C M	U3O8 GRADE	C G I	M. O.DE I.II	DILUTED/MINED-OUT PORTION U3O8 AVG. DIL.	U3O8 GRADE MINED	METAL PER UNIT AREA GROSS DIL.	GROSS MINED	NET DIL.	NET MINED	THICKNESS DIL.	THICKNESS MINED	ID D	ID M
	0	0.00	20.00	20.00	-55	60	WW	X	0			0.00	-											
	4	-20.00	48.00	48.00	-55	59	WW	2	90			0.00	-											
	4	-68.00	48.00	48.00	-54	57	WW	2	90			0.00	-											
	4	-116.00	48.00	48.00	-54	55	WW	2	90			0.00	-											
	4	-164.00	48.00	48.00	-53	52	WW	2	90			0.00	-											
	4	-212.00	48.00	48.00	-52	50	WW	2	90			0.00	-											
	4	-260.00	48.00	48.00	-52	48	WW	2	90			0.00	-											
	4	-308.00	48.00	48.00	-51	46	WW	2	90			0.00	-											
	4	-356.00	48.00	48.00	-51	44	WW	2	90			0.00	-											
	4	-404.00	48.00	48.00	-50	41	WW	2	90			0.00	-											
	4	-452.00	48.00	48.00	-50	39	WW	2	90			0.00	-											
	4	-500.00	50.00	50.00	-49	37	WW	2	90			0.00	-											
	4	-550.00	50.00	50.00	-51	37	WW	2	90			0.00	-											
	4	-600.00	50.00	50.00	-52	37	WW	2	90			0.00	-											
	4	-650.00	50.00	50.00	-54	36	WW	2	90			0.00	-											
	4	-700.00	50.00	50.00	-56	36	WW	2	90			0.00	-											
	4	-750.00	50.00	50.00	-57	36	WW	2	90			0.00	-											
	4	-800.00	50.00	50.00	-59	36	WW	2	90			0.00	-											
	4	-850.00	50.00	50.00	-61	36	WW	2	90			0.00	-											
	4	-900.00	50.00	50.00	-63	35	WW	2	90			0.00	-											
	4	-950.00	50.00	50.00	-64	35	WW	2	90			0.00	-											
	4	-1000.00	50.00	50.00	-66	35	WW	2	90			0.00	-											
	4	-1050.00	50.00	50.00	-64	36	WW	2	90			0.00	-											
	4	-1100.00	50.00	50.00	-62	37	WW	2	90			0.00	-											
	4	-1150.00	50.00	50.00	-60	38	WW	2	90			0.00	-											
	4	-1200.00	50.00	50.00	-58	39	WW	2	90			0.00	-											
	4	-1250.00	50.00	50.00	-55	39	WW	2	90			0.00	-											
	4	-1300.00	50.00	50.00	-53	40	WW	2	90			0.00	-											
	4	-1350.00	50.00	50.00	-51	41	WW	2	90			0.00	-											
	4	-1400.00	50.00	50.00	-49	42	WW	2	90			0.00	-											
	4	-1450.00	50.00	50.00	-47	43	WW	2	90			0.00	-											
	4	-1500.00	42.50	42.50	-45	44	WW	2	90			0.00	-											
	4	-1542.50	42.50	42.50	-44	43	WW	2	90			0.00	-											
	4	-1585.00	42.50	42.50	-44	42	WW	2	90			0.00	-											
	4	-1627.50	4.20	4.20	-43	40	W	C		M	100	0.00	-											
	4	-1631.70	40.70	40.70	-43	40	W	R V		B	100	0.00	-											
	4	-1672.40	40.70	40.70	-43	39	W	R V		B	100	0.00	-											
	4	-1713.10	6.90	6.90	-42	38	W	C S	J	100		0.00	-											
1595	4	-1720.00	5.00	5.00	-42	38	W	C S	J	100	S B	3.24	*											
1596	4	-1725.00	1.40	1.40	-42	37	W	C S	J	100	S B	.64	-											
1597	4	-1726.40	5.00	5.00	-42	37	W	C S	J	100	S B	3.56	*	D2	3.82		1.18		.18		10.00		01	
1598	4	-1731.40	3.60	3.60	-42	37	W	C S	J	100	S B	4.54	*	D2										
1599S	4	-1735.00	1.40	1.40	-42	37	W	C S	J	100	S B	2.92	*	D2										
1599S	4	-1736.40	3.60	3.60	-42	37	W	C S	J	100	S B	2.92	-											

R0100 ANALYSIS OF DRILL-HOLE DATA 10/09/82 MEG DRILL-HOLE NUMBER ZZX0000 PAGE 2

SAMPLE NUMBER	S M	DIST. FROM COLLAR	SEGMENT THICKNESS APPAR.	SEGMENT APPAR.	SEGMENT DIP	SEGMENT AZI.	R T	C	PERC. CORE REC.	A M	C M	U308 GRADE	C G I	M. O.DE I.II	DILUTED/MINED-OUT PORTION U308 AVG. DIL.	U308 GRADE MINED	METAL PER UNIT AREA GROSS DIL.	GROSS MINED	NET DIL.	NET MINED	THICKNESS DIL.	THICKNESS MINED	ID D	ID M
	4	-1740.00	10.80	10.80	-42	37	W	C	S	J	100		0.00	-										
	4	-1750.80	46.00	46.00	-43	38	W	B	S	P	100		0.00	-										
	4	-1796.80	46.00	46.00	-48	42	W	B	S	P	100		0.00	-										
	4	-1842.80	46.00	46.00	-54	45	W	B	S	P	100		0.00	-										
	4	-1888.80	46.20	46.20	-59	49	W	B	S	P	100		0.00	-										

R0100 ANALYSIS OF DRILL-HOLE DATA - SUMMARY 10/09/82 MEG DRILL-HOLE NUMBER ZZX0000 PAGE 1

PORTION ID.	DIST FROM COLLAR	APPAR. THICKNESS	TONS PER AREA	U3O8 AVG. GRADE	U3O8 METAL PER GROSS	AREA NET	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA
D 01 TT	-1726.4	10.0	.833	3.82	3.18	.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E 01 TT	-1726.4	10.0	.833	3.82	3.18	.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R0100 A N A L Y S I S O F D R I L L - H O L E D A T A 10/09/82 MEG DRILL-HOLE NUMBER ZZX0038 PAGE 1

COMBINED WITH	ZZX0039	DEPARTURE	7600.00	DDH TYPE	AXT	U3O8 CUT-OFF GRADE	3.00
COMPANY DRILL HOLE NUMBER	77032	LATITUDE	8540.00	HOLE DIAMETER (INCHES)	0.000	MIN. MINING WIDTH	10.00
SPECIAL DRILL-HOLE IDENT.		COLLAR ELEVATION	1210.50	INITIAL CASING TYPE		MIN. WASTE THICKNESS	0.00
DRILLING STARTED	15/10/77	HOLE LENGTH	244.30	INITIAL CASING LENGTH	0.00	MAX. DIL. WIDTH	0.00
DRILLING COMPLETED	15/10/77	DIP OF HOST FORMATION	-60	FINAL CASING TYPE		TOP CUT WIDTH	0.00
		AZIMUTH OF DIP OF H.F.	170	FINAL CASING LENGTH	0.00	ZONE(S)	ALL
LOCATION UNDERGROUND HOLE . 200 LEVEL . K ZONE				NUMBER OF SEGMENTS	58		

SAMPLE NUMBER	S M	DIST. FROM COLLAR	SEGMENT THICKNESS APPAR.	SEGMENT APPAR.	DIP	AZI.	R C	R T	PERC. CORE REC.	A M	C M	U3O8 GRADE	C W. G I	O.DE I.II	DILUTED/MINED-OUT PORTION U3O8 AVG. DIL.	U3O8 GRADE MINED	METAL PER UNIT AREA GROSS DIL.	GROSS MINED	NET DIL.	NET MINED	THICKNESS DIL.	THICKNESS MINED	ID D	ID M
	3	172.10	17.10	17.10	0	180			100	0		0.00	-											
	3	155.00	3.90	3.90	0	180			100	0		0.00	-											
	0	151.10	1.60	1.60	0	180			0	0		0.00	-											
	3	149.50	13.90	13.90	0	180			100	0		0.00	-											
33-18	3	135.60	2.90	2.90	0	180			100	B	B	1.22	-											
	3	132.70	47.20	47.20	0	180			100	0		0.00	-											
33-17	3	85.50	1.40	1.40	0	180			100	B	B	.68	-											
33-16	3	84.10	1.20	1.20	0	180	P		100	B	B	4.34	+	D2	6.61		7.33		3.34		13.30		01	
33-15	3	82.90	2.90	2.90	0	180	P		100	B	B	12.32	+	D2										
33-14	3	80.00	2.40	2.40	0	180	P		100	B	B	12.68	+	D2										
33-13	3	77.60	.90	.90	0	180	P		100	A	B	.10	-	D2										
	3	76.70	1.70	1.70	0	180	P		100	0		0.00	-	D2										
33-12	3	75.00	.90	.90	0	180	P		100	A	B	3.96	+	D2										
33-12	3	74.10	1.60	1.60	0	180	P		100	A	B	3.92	+	D2										
33-12	3	72.50	1.70	1.70	0	180	P		100	B	B	3.92	+	D2										
	3	70.80	3.50	3.50	0	180	P		100	0		0.00	-											
33-11	3	67.30	.80	.80	0	180	P		100	B	B	5.52	+											
	3	66.50	1.60	1.60	0	180	P		100	0		0.00	-											
33-10	3	64.90	.80	.80	0	180	P		100	A	B	8.76	+											
33-9	3	64.10	1.90	1.90	0	180			100	B	B	.92	-											
	3	62.20	11.00	11.00	0	180			100	0		0.00	-											
	3	51.20	1.30	1.30	0	180			100	0		0.00	-											
	3	49.90	.80	.80	0	180			100	0		0.00	-											
	3	49.10	4.50	4.50	0	180			100	0		0.00	-											
	3	44.60	16.30	16.30	0	180			100	0		0.00	-											
	3	28.30	.30	.30	0	180			100	0		0.00	-											
	3	28.00	3.20	3.20	0	180			100	0		0.00	-											
33-8	3	24.80	1.10	1.10	0	180			100	B	B	.56	-											
33-7	3	23.70	2.10	2.10	0	180			100	A	B	1.96	-											
33-6	3	21.60	1.60	1.60	0	180			100	B	B	.42	-											
	3	20.00	9.00	9.00	0	180			100	0		0.00	-											
33-5	3	11.00	1.70	1.70	0	180			100	B	B	1.28	-											
33-4	3	9.30	2.10	2.10	0	180	K		100	A	B	5.94	+	D2	3.70		3.15		.15		10.00		02	
33-3	3	7.20	2.20	2.20	0	180	K		100	A	B	6.16	+	D2										
33-2	3	5.00	1.70	1.70	0	180	K		100	A	B	1.04	-	D2										
33-1	3	3.30	3.30	3.30	0	180	K		100	A	B	2.43	-	D2										
	S 1	-.00	.70	.70	0	180	K		100	A	B	2.96	-	M D2		2.67		2.61		-.90		11.70		01
	S 1	-.70	4.30	4.30	0	180	K		100	A	B	2.96	-	M										
	1	-5.00	4.70	4.70	0	180	K		100	A	B	2.46	-	M										
	3	-11.70	2.80	2.80	0	180	K		100	C	E	0.00	-											
32-1	3	-14.50	3.80	3.80	0	180	K		100	S	B	1.56	-											
32-2	3	-18.30	2.10	2.10	0	180	K		100	S	B	4.84	+	D1	5.91		8.32		3.25		16.90		03	
32-3	3	-20.40	2.80	2.80	0	180	K		100	S	B	7.86	+	D1										
32-4	3	-23.20	2.30	2.30	0	180	K		100	S	B	9.24	+	D1										

R0100 ANALYSIS OF DRILL-HOLE DATA 10/09/82 MEG DRILL-HOLE NUMBER ZZA0038 PAGE 2

SAMPLE NUMBER	A M	C M	THO2 GRADE	A M	C M	AU GRADE	A M	C M	GRADE	M CDE III	DILUTED / MINED-OUT PORTION: THORIUM DIOXIDE AVG. GRADE DIL.	THORIUM DIOXIDE AVG. GRADE MINED	THORIUM DIOXIDE METAL PER AREA DIL.	THORIUM DIOXIDE METAL PER AREA MINED	GOLD AVG. GRADE DIL.	GOLD AVG. GRADE MINED	GOLD METAL PER AREA DIL.	GOLD METAL PER AREA MINED	ID DIL.	ID MINED
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
33-18			0.00	D	A	.04			0.00											
			0.00	0		0.00			0.00											
33-17			0.00	D	A	.02			0.00											
33-16			0.00	D	A	.15			0.00	D2	0.00		0.00		.22		.24		0.00		0.00		01	
33-15			0.00	D	A	.41			0.00	D2										
33-14			0.00	D	A	.42			0.00	D2										
33-13			0.00	D	A	.00			0.00	D2										
			0.00	0		0.00			0.00	D2										
33-12			0.00	D	A	.13			0.00	D2										
33-12			0.00	D	A	.13			0.00	D2										
33-12			0.00	D	A	.13			0.00	D2										
			0.00	0		0.00			0.00											
33-11			0.00	D	A	.18			0.00											
			0.00	0		0.00			0.00											
33-10			0.00	D	A	.29			0.00											
33-9			0.00	D	A	.03			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
			0.00	0		0.00			0.00											
33-8			0.00	D	A	.02			0.00											
33-7			0.00	D	A	.07			0.00											
33-6			0.00	D	A	.01			0.00											
			0.00	0		0.00			0.00											
33-5			0.00	D	A	.04			0.00											
33-4			0.00	D	A	.20			0.00	D2	0.00		0.00		.13		.11		0.00		0.00		02	
33-3			0.00	D	A	.21			0.00	D2										
33-2			0.00	D	A	.04			0.00	D2										
33-1			0.00	D	A	.08			0.00	D2										
S			0.00	D	A	.10			0.00	MD2		0.00		0.00		.09		.09		0.00		0.00		01
S			0.00	D	A	.10			0.00	M										
			0.00	D	A	.08			0.00	M										
	C	E	0.00			0.00			0.00											
32-1	C	E	0.00			0.00			0.00											
32-2	C	E	0.00			0.00			0.00	D1	.36		.50		0.00		0.00		0.00		0.00		03	
32-3	S	B	1.66			0.00			0.00	D1										
32-4	C	E	0.00			0.00			0.00	D1										

R0100 ANALYSIS OF DRILL-HOLE DATA 10/09/82 MEG DRILL-HOLE NUMBER ZZX0038 PAGE 3

SAMPLE NUMBER	S W	DIST. FROM COLLAR	SEGMENT THICKNESS APPAR.	SEGMENT APPAR.	DIP	AZI.	R C	R T	PERC. CORE REC.	A M	C M	U308 GRADE	C G I	M. O.DE I.II	DILUTED/MINED-OUT PORTION U308 AVG. DIL.	U308 GRADE MINED	METAL PER UNIT AREA GROSS DIL.	GROSS MINED	NET DIL.	NET MINED	THICKNESS DIL.	THICKNESS MINED	ID D	ID M
32-5	3	-25.50	2.50	2.50	0	180	K		100	S	B	4.34	•	D1										
32-6	3	-28.00	3.70	3.70	0	180	K		100	S	B	4.30	•	D1										
32-7	3	-31.70	1.80	1.80	0	180	K		100	S	B	3.66	•	D1										
32-8	3	-33.50	.50	.50	0	180	K		100	S	B	3.66	•	D1										
32-9	3	-34.00	1.20	1.20	0	180	K		100	S	B	9.36	•	D1										
32-10	3	-35.20	1.50	1.50	0	180	K		100	S	B	.16	-											
32-11	3	-36.70	1.70	1.70	0	180	K		100	S	B	3.08	•											
32-12	3	-38.40	1.30	1.30	0	180	K		100	S	B	3.08	•											
32-13	3	-39.70	.90	.90	0	180			100	S	B	.98	-											
32-14	3	-40.60	1.10	1.10	0	180			100	S	B	.98	-											
32-15	3	-41.70	1.80	1.80	0	180			100	S	B	1.74	-											
32-16	3	-43.50	1.70	1.70	0	180			100	S	B	.62	-											
	3	-45.20	1.20	1.20	0	180			100	C	E	0.00	-											
	3	-46.40	3.60	3.60	0	180			100	C	E	0.00	-											
	3	-50.00	22.20	22.20	0	180			100	C	E	0.00	-											

SAMPLE NUMBER	ACM	THO2 GRADE	AU ACM	AU GRADE	ACM	GRADE	MODE III	DILUTED/MINED-OUT PORTION: THORIUM DIOXIDE AVG. GRADE DIL.	THORIUM DIOXIDE AVG. GRADE MINED	THORIUM DIOXIDE METAL PER AREA DIL.	THORIUM DIOXIDE METAL PER AREA MINED	GOLD AVG. GRADE DIL.	GOLD AVG. GRADE MINED	GOLD METAL PER AREA DIL.	GOLD METAL PER AREA MINED	ID DIL.	ID MINED
32-5	C E	0.00		0.00		0.00	D1										
32-6	C E	0.00		0.00		0.00	D1										
32-7	S B	.76		0.00		0.00	D1										
32-8	C E	0.00		0.00		0.00	D1										
32-9	C E	0.00		0.00		0.00	D1										
32-10	C E	0.00		0.00		0.00											
32-11	S B	.64		0.00		0.00											
32-12	C E	0.00		0.00		0.00											
32-13	C E	0.00		0.00		0.00											
32-14	C E	0.00		0.00		0.00											
32-15	S B	.36		0.00		0.00											
32-16	C E	0.00		0.00		0.00											
	C E	0.00		0.00		0.00											
	C E	0.00		0.00		0.00											
	C E	0.00		0.00		0.00											

R0100 ANALYSIS OF DRILL-HOLE DATA - SUMMARY 10/09/82 MEG DRILL-HOLE NUMBER ZZX0038 PAGE 1

PORTION ID.	DIST FROM COLLAR	APPAR. THICKNESS	TONS PER AREA	U3O8 AVG. GRADE	U3O8 METAL PER AREA GROSS	U3O8 METAL PER AREA NET	THO2 AVG. GRADE	THO2 METAL/AREA	AU AVG. GRADE	AU METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA	AVG. GRADE	METAL/AREA
D 01 TT	84.1	13.3	1.10A	6.61	7.33	3.34	0.00	0.00	.22	.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E 01 TT	84.1	13.3	1.10A	6.61	7.33	3.34	0.00	0.00	.22	.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D 02 TT	9.3	10.0	.833	3.79	3.15	.15	0.00	0.00	.13	.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E 02 TT	9.3	10.0	.833	3.79	3.15	.15	0.00	0.00	.13	.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D 03 TT	-18.3	16.9	1.40A	5.91	8.32	3.25	.36	.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E 03 TT	-18.3	16.9	1.40A	5.91	8.32	3.25	.36	.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
M 01 TT	-.0	11.7	.975	2.67	2.61	-.90	0.00	0.00	.09	.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
ZZX0009    X15          19720.0    2590.0    1152.0    2
D    1TT  M          20392.0    3356.7    -224.3    -.7363     .6534        20396.5    3362.6    -231.0    -.7341     .6483
                     20392.0    3356.7    -224.3   20396.5    3362.6    -231.0   20394.8    3360.3    -228.5     .0833     10.00
                           1     3.823     3.185    0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
E    1TT  M          20392.0    3356.7    -224.3    -.7363     .6534        20396.5    3362.6    -231.0    -.7341     .6483
                     20392.0    3356.7    -224.3   20396.5    3362.6    -231.0   20394.8    3360.3    -228.5     .0833     10.00
                           1     3.823     3.185    0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
ZZX0038  77032          7600.0    8540.0    1210.5    7
D    1TT  P           7600.0    8635.8    1210.5    0.0000    9.4248         7600.0    8622.5    1210.5    0.0000    9.4248
                      7600.0    8635.8    1210.5    7600.0    8622.5    1210.5    7600.0    8628.7    1210.5     .0833     13.30
                           1     6.613     7.327    2     0.000     0.000    5      .220      .244    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
E    1TT  P           7600.0    8635.8    1210.5    0.0000    9.4248         7600.0    8622.5    1210.5    0.0000    9.4248
                      7600.0    8635.8    1210.5    7600.0    8622.5    1210.5    7600.0    8628.7    1210.5     .0833     13.30
                           1     6.613     7.327    2     0.000     0.000    5      .220      .244    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
D    2TT  K           7600.0    8561.0    1210.5    0.0000    9.4248         7600.0    8551.0    1210.5    0.0000    3.1416
                      7600.0    8561.0    1210.5    7600.0    8551.0    1210.5    7600.0    8555.7    1210.5     .0833     10.00
                           1     3.787     3.155    2     0.000     0.000    5      .126      .105    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
E    2TT  K           7600.0    8561.0    1210.5    0.0000    9.4248         7600.0    8551.0    1210.5    0.0000    3.1416
                      7600.0    8561.0    1210.5    7600.0    8551.0    1210.5    7600.0    8555.7    1210.5     .0833     10.00
                           1     3.787     3.155    2     0.000     0.000    5      .126      .105    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
D    3TT  K           7600.0    8533.4    1210.5    0.0000    3.1416         7600.0    8516.5    1210.5    0.0000    3.1416
                      7600.0    8533.4    1210.5    7600.0    8516.5    1210.5    7600.0    8523.8    1210.5     .0833     16.90
                           1     5.910     8.320    2      .356      .501    5     0.000     0.000    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
E    3TT  K           7600.0    8533.4    1210.5    0.0000    3.1416         7600.0    8516.5    1210.5    0.0000    3.1416
                      7600.0    8533.4    1210.5    7600.0    8516.5    1210.5    7600.0    8523.8    1210.5     .0833     16.90
                           1     5.910     8.320    2      .356      .501    5     0.000     0.000    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
M    1TT  K           7600.0    8551.7    1210.5    0.0000    9.4248         7600.0    8540.0    1210.5    0.0000    3.1416
                      7600.0    8551.7    1210.5    7600.0    8540.0    1210.5    7600.0    8546.3    1210.5     .0833     11.70
                           1     2.674     2.606    2     0.000     0.000    5      .089      .087    0     0.000     0.000
                           0     0.000     0.000    0     0.000     0.000    0     0.000     0.000
```

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APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

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82–102 TR

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CANMET

Canada Centre for Mineral and Energy Technology — Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2010 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal planning purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

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27pp

ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

DIVISION REPORT ERP/MRL 82-102(TR)

PROGRAM MEG2010 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2010 is to select economical intersections from a file created by MEG0100 and to calculate the global reserves of a deposit when equal zone of influence can be given to all intersections. The selection of economical intersections is based on criteria such as: elevation at mid-point of intersection; thickness, grade or density of each economical intersection; specified mineralized zone; and type of reserves.

MEG2010 can be used as a transition program, that is, creating an interface file to be used by other GEM programs or can be used strickly for the calculation of the global reserves.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

---

*Mining Geologist and Geostatistician, Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa.

GUIDE D'USAGER POUR LE PROGRAMME MEG2010
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2010 est de choisir certaines intersections économiques d'un fichier créé par MEG0100 et de calculer les réserves globales d'un gisement lorsque chaque intersection peut recevoir la même zone d'influence. Le choix des intersections économiques est basé sur des critères tels que: l'élévation du point milieu de l'intersection; l'épaisseur, la teneur ou la densité de chaque intersection; une ou plusieurs zones minéralisées; ainsi que la catégorie de réserves. MEG2010 peut être utilisé comme programme de transition en créant un fichier qui pourra être utilisé par d'autres programmes du système GEM. MEG2010 peut ainsi être utilisé strictement pour le calcul des réserves globales.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

---

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2010(IBLOC,K1,K2)
C*
C*
C*****************************************************************************
C*                                                                            *
C******GENERAL DESCRIPTION                                                    *
C*                                                                            *
C*     PROGRAM MEG2010 SELECTS ECONOMICAL INTERSECTIONS FROM A FILE           *
C*     CREATED BY MEG0100 (COMPOS). THE VARIABLES WHICH CAN BE USED FOR       *
C*     A GIVEN SELECTION ARE: ELEVATIONS AT MIDPOINT OF INTERSECTION,         *
C*     MINERALIZED ZONES, THICKNESS, GRADE AND DENSITY OF COMPOSITE           *
C*     ECONOMICAL INTERSECTIONS. ALL INDIVIDUAL INTERSECTIONS FOR A           *
C*     GIVEN DRILLHOLE THAT SATISFIES SOME CRITERIA ABOUT THE ABOVE           *
C*     MENTIONED VARIABLES WILL BE GROUPED INTO A SINGLE TOTAL COMPO-         *
C*     SITE INTERSECTION. ONLY THOSE COMPOSITE INTERSECTIONS FALLING          *
C*     WITHIN A BLOCK FOR WHICH THE TYPE OF RESERVE INDICATOR (IBLOC)         *
C*     CORRESPOND TO IOTR, WILL BE USED FOR THE GLOBAL RESERVE CALCU-         *
C*     LATION.                                                                *
C*     THIS PROGRAM READS ECONOMICAL INTERSECTION DATA FROM THE OUTPUT         *
C*     FILE OF PROGRAM MEG0100 ON TAPE3, AND AFTER REMOVING ALL               *
C*     INTERSECTIONS WHICH DO NOT SATISFY THE USER'S OPTIONS. THE              *
C*     PROGRAM WILL COMPUTE:                                                  *
C*           -THE AVERAGE GRADE OF THE CHOSEN (DILUTED) ECONOMICAL            *
C*            INTERSECTIONS FOR EACH DRILLHOLE;                               *
C*           -THE TOTAL THICKNESS OF THESE INTERSECTIONS PER                  *
C*           -DRILLHOLE;                                                      *
C*           -THE AVERAGE DENSITY OF THESE ECONOMICAL INTERSECTIONS           *
C*            PER DRILLHOLE;                                                  *
C*           -THE TOTAL METAL PER UNIT AREA FOR THE CHOSEN ECONOMICAL         *
C*            INTERSECTIONS FOR EACH DRILLHOLE;                               *
C*           -TOTAL TONNAGE PER UNIT AREA;                                    *
C*           -SUMMARY TABLE OF:  ORE TONNAGE                                  *
C*                               AVERAGE GRADE                                *
C*                               METAL POUNDAGE                               *
C*                               AVERAGE THICKNESS                            *
C*                    WITH RESPECT TO A GIVEN UNIT SURFACE OF                 *
C*                   INFLUENCE AROUND NEWLY DETERMINED COMPOSITE              *
C*                   INTERSECTIONS.                                           *
C*                                                                            *
C*     N.B. THIS PROGRAM DOES NOT REQUIRE VARIABLE DIMENSIONS.                *
C*     THIS PROGRAM HAS BEEN WRITTEN IN CDC FORTRAN LEVEL 4.8 AND WAS         *
C*     ORIGINALLY CREATED BY RAYMOND SABOURIN. (EMR, CANMET, MRL),            *
C*     MAY, 1982.                                                             *
C*                                                                            *
C*****************************************************************************
C*                                                                            *
C*                                                                            *
C*****************************************************************************
C*                                                                            *
C******OPTIONS READ ON INPUT                                                  *
C*                                                                            *
C*     CARD 1 - DIMX,DIMY,TONFAC,ELEVTOP,ELEVBOT,ISDI                         *
C*              FORMAT READ IS (5F10.0,I1)                                    *
C*         DIMX,DIMY - DIMENSIONS OF THE ZONE OF INFLUENCE OF EACH            *
C*                     COMPOSITE INTERSECTION;                                *
C*                     IF DIMX=DIMY=0.0, THE SUMMARY TABLE WILL BE            *
C*                     SUPPRESSED. DIMX AND DIMY WILL ALSO BE USED TO         *
```

```
C*                DETERMINE INDICES OF IBLOC WHEN TYPE OF RESERVES      *
C*                OPTIONS IOTR IS USED.                                 *
C*          TONFAC - TONNAGE FACTOR (INVERSE OF DENSITY) IF TONFAC IS   *
C*                GREATER THAN ZERO IT WILL REPLACE THE ONE CODED ON    *
C*                TAPE3. OTHERWISE THE PROGRAM WILL READ THE TONNAGE    *
C*                FACTOR CODED ON TAPE3.                                *
C*          ELEVTOP, ELEVBOT - RESPECTIVE UPPER AND LOWER LIMITS OF     *
C*                           ACCEPTABLE ELEVATIONS FOR MIDPOINTS OF     *
C*                           INDIVIDUAL ECONOMICAL INTERSECTIONS.       *
C*          ISDI  - OPTION TO PRINT A MORE DETAILED SUMMARY             *
C*                0 OR BLANK, (DEFAULT). NO ADDITIONAL INFORMATION IS   *
C*                PRINTED                                               *
C*                1, SIX MORE VARIABLES ARE PRINTED ON THE SUMMARY      *
C*                INCLUDING NUMBER OF HOLES USED AND AVERAGE GRADE      *
C*                OF ALL COMPOSITE INTERSECTIONS.                       *
C*          TE1   - TE1 MAY BE EQUAL TO D, E OR M, DEPENDING IF ONLY    *
C*                DILUTED, ECONOMICAL OR MINED-OUT INTERSECTIONS ARE     *
C*                TO BE READ BY THE PROGRAM. THESE INTERSECTIONS ARE     *
C*                DEFINED BY MEG0100.                                   *
C*                                                                      *
C*     CARD 2 - K,N,IOTR,IFREE,NX,NY,XREF,YREF                          *
C*              FORMAT READ IS (2I5,15I2,3I5,2F10.0)                    *
C*          K     - NUMBER OF LIMITING VALUES TO BE IDENTIFIED WITH     *
C*                REJECTION INDICATORS ON FILE FOR THE THICKNESS,       *
C*                GRADE AND DENSITY OF INDIVIDUAL ECONOMICAL            *
C*                INTERSECTIONS.                                        *
C*                IF K.EQ.0 CARD NO 3 IS NOT READ                       *
C*                K.LE.15                                               *
C*                SEE CARD 3 FOR RANGES TO BE ELIMINATED;               *
C*          N     - NUMBER OF MINERALIZED ZONES TO BE CONSIDERED;       *
C*                IF N=0, ALL ZONES ARE CONSIDERED AND CARD NO. 4 IS    *
C*                NOT READ.                                             *
C*                N.B. N.LE.10;                                         *
C*                SEE CARD 4 FOR SPECIFICATION OF ZONE IDENTIFIERS;     *
C*          IOTR  - RESERVE TYPE INDICATOR, ARRAY OF MAXIMUM 15.        *
C*                IF IOTR=0, ALL INTERSECTIONS ARE CONSIDERED PART      *
C*                OF THE SAME TYPE OF RESERVES AND OPTION CARDS 5       *
C*                AND 6 ARE NOT READ.                                   *
C*                IF IOTR.GT.0, ONLY THE TYPE OF RESERVES IDENTIFIED    *
C*                AS IOTR BY CARD NO.5 WILL BE ACCEPTED;                *
C*          IFREE - OPTION INDICATING IF THE TYPE OF RESERVE INDICATORS *
C*                GIVEN ON CARDS NO.6 ARE READ IN FREE FORMAT(IFREE=    *
C*                1) OR IN CODED FORMAT(IFREE=0)                        *
C*                IF IFREE=1, OPTION CARD NO.5 IS NOT READ AND TYPE     *
C*                OF RESERVES INDICATORS ARE READ ON INPUT DATA CARDS   *
C*                (TAPE1)                                               *
C*                IF IFREE=0, OPTION CARD NO.5 IS READ AND TYPE OF      *
C*                RESERVES INDICATORS ARE READ ON A DISK FILE(TAPE5);   *
C*          NX,NY - NUMBER OF INDICATORS IN X(NX) AND IN Y(NY) FOR      *
C*                IBLOC;                                                *
C*          XREF,YREF - COORDINATES OF REFERENCE POINT FOR TYPE OF      *
C*                RESERVES INDICATORS.                                  *
C*                                                                      *
C*     CARD 3 - OPTIONS ARE; IV(J), V1(J), V2(J)                        *
C*              FORMAT IS (I5,2F10.3)                                   *
C*              CARD IS NOT READ IF K.EQ.0;                             *
C*              J=1,K; FOR EACH VALUE OF J, A NEW CARD IS USED.         *
```

```
C*            IV     - IDENTIFIES THE VARIABLE ON WHICH LIMITING VALUES       *
C*                       WILL BE APPLIED.                                     *
C*                       IV=1: LIMITING VALUES APPLIED ON THICKNESS           *
C*                       IV=2: LIMITING VALUES APPLIED ON GRADES              *
C*                       IV=3: LIMITING VALUES APPLIED ON DENSITIES           *
C*            V1     - LOWER LIMITING VALUE                                   *
C*            V2     - UPPER LIMITING VALUE                                   *
C*                 ECONOMICAL INTERSECTIONS FOUND WITHIN THESE LIMITS         *
C*                 (INCLUSIVELY) ARE IDENTIFIED BY A REJECTION INDICATOR      *
C*                 TO BE USED BY OTHER GEOSTATISTICAL PROGRAMS.               *
C*                 THIS CARD MAY BE REPEATED UP TO FIFTEEN TIMES:             *
C*                                                                            *
C*      CARD 4 - (REEF(J),J=1,N)                                              *
C*               FORMAT READ IS (10R3)                                        *
C*               CARD IS NOT READ IF N=0.                                     *
C*          REEF   - ONLY ECONOMICAL INTERSECTIONS WITH IDENTIFYING           *
C*                     CODES FOR MINERALIZATION ZONES IDENTICAL TO REEF       *
C*                     CODES WILL BE ACCEPTED.                                *
C*                     THESE CODES MUST BE RIGHT JUSTIFIED:                   *
C*                     NO MORE THAN TEN CODES ARE TO BE USED:                 *
C*                                                                            *
C*      CARD 5 - HTN                                                          *
C*               FORMAT READ IS (8A10)                                        *
C*               CARD IS NOT READ IF IFREE=1 OR IF IOTR=0.                    *
C*          HTN    - CODED FORMAT OF TYPE OF RESERVE INDICATORS.              *
C*                     HTN USUALLY REPRESENTS THE FORMAT FOR ONE LINE OF      *
C*                     RESERVE INDICATORS (IBLOC).                            *
C*                                                                            *
C*      CARD 6 - ((IBLOC(NY-I+1,J),J=1,NX),I=1,NY)                            *
C*               IF IFREE=1, FORMAT READ IS FREE FORMAT:                      *
C*               IF IFREE=0, FORMAT READ IS CODED FORMAT HTN:                 *
C*               CARD NO.6 IS NOT READ IF IOTR=0:                             *
C*          IBLOC  - TYPE OF RESERVE INDICATORS. THEY ARE POSITIVE            *
C*                     INTEGER VALUES. EACH COMPOSITE INTERSECTION WILL       *
C*                     HAVE INDICES CALCULATED USING: DEP, LAT, XREF,         *
C*                     YREF, DIMX, DIMY. TO EACH SET OF INDICES CORRES-       *
C*                     PONDS AN INDICATOR FOR THE TYPE OF RESERVES.           *
C*                     INDICATORS ARE READ LINE BY LINE FROM LEFT TO          *
C*                     RIGHT AND FROM TOP TO BOTTOM.                          *
C*                                                                            *
C******************************************************************************
C*
C*
C******************************************************************************
C*                                                                            *
C******FILES USED                                                             *
C*                                                                            *
C*      TAPE1  - INPUT DATA CARDS                                             *
C*      TAPE2  - OUTPUT LISTING, SEE OUTPUT DISPOSITION                       *
C*      TAPE3  - INPUT FILE CREATED BY PROGRAM MEG0100 IN PREVIOUS            *
C*               RUN (PFNI)                                                   *
C*      TAPE4  - OUTPUT FILE OF DILUTED INTERSECTIONS (PFNO)                  *
C*               RECORDING STATEMENT ON TAPE4 IS:                             *
C*                  WRITE(4,25) UDN,DEPT1,LATIT1,ELEVA1,THICK1,DENS1,         *
C*                              GRADE1,METAL1,TON1,IRST,IRSG,IRSM,IRSA,       *
C*                              IOTR(LLL)                                     *
C*               25 FORMAT(R7,4F10.3,F10.4,2F10.3,F10.4,5I5)                  *
```

```
C*      TAPE5  - INPUT FILE OF TYPE OF RESERVE INDICATORS(IBLOC) (PFNI2)*
C*                                                                      *
C*********************************************************************
C*                                                                      *
C******OUTPUT DISPOSITION                                              *
C*                                                                      *
C*      SECTION 1 - OPTIONS APPLIED ARE PRINTED;                        *
C*      SECTION 2 - DETAILED RESULTS FOR EACH TOTAL ECONOMICAL          *
C*                  INTERSECTION ARE PRINTED;                           *
C*      SECTION 3 - RESERVE ESTIMATION USING EQUAL UNIT AREA OF         *
C*                  INFLUENCE IS PRINTED;                               *
C*                                                                      *
C*********************************************************************
C*                                                                      *
C*                                                                      *
C*********************************************************************
C*                                                                      *
C******VARIABLES USED                                                  *
C*                                                                      *
C*      UDN     = MEG DRILL HOLE NUMBER;                                *
C*      DEPT1   = AVERAGE DEPARTURE OF ALL INTERSECTIONS ALONG THE      *
C*                DRILL HOLE;                                           *
C*      LATIT1  = AVERAGE LATITUDE OF ALL INTERSECTIONS ALONG THE       *
C*                DRILL HOLE;                                           *
C*      ELEVA1  = AVERAGE ELEVATION OF ALL ECONOMICAL INTERSECTIONS IN  *
C*                THE DRILL HOLE;                                       *
C*      THICK1  = TOTAL PROJECTED THICKNESS OF ALL ECONOMICAL           *
C*                INTERSECTIONS ALONG THE DRILL HOLE;                   *
C*      GRADE1  = WEIGTHED AVERAGE GRADE OF ALL INTERSECTIONS ALONG     *
C*                THE DRILL HOLE;                                       *
C*      DENS1   = WEIGTHED AVERAGE DENSITY OF ALL INTERSECTIONS ALONG   *
C*                THE DRILL HOLE;                                       *
C*      METAL1  = TOTAL METAL OF ALL INTERSECTIONS ALONG THE DRILL HOLE; *
C*      TON1    = TOTAL TONNAGE OF ALL INTERSECTIONS ALONG THE DRILL    *
C*                HOLE;                                                 *
C*      IRST    = THICKNESS REJECTION INDICATOR; IF IRST=1, TOTAL       *
C*                INTERSECTION THICKNESS IS FOUND OUTSIDE OF PERMISSIBLE *
C*                RANGE; OTHERWISE IRST=0;                              *
C*      MT1     = COUNTER FOR UNREJECTED TOTAL THICKNESS INTERSECTION;  *
C*      IRSG    = GRADE REJECTION INDICATOR; IF IRSG=1, TOTAL           *
C*                INTERSECTION GRADE IS FOUND OUTSIDE OF PERMISSIBLE    *
C*                RANGE; OTHERWISE IRSG=0;                              *
C*      MG1     = COUNTER FOR UNREJECTED TOTAL THICKNESS INTERSECTION;  *
C*      IRSM    = DENSITY REJECTION INDICATOR; IF IRSM=1, TOTAL         *
C*                INTERSECTION DENSITY IS FOUND OUTSIDE OF PERMISSIBLE  *
C*                RANGE; OTHERWISE IRSM=0;                              *
C*      MM1     = COUNTER FOR UNREJECTED WEIGHTED AVERAGE DENSITY OF    *
C*                TOTAL INTERSECTION;                                   *
C*      IRSA    = OVERALL REJECTION INDICATOR; IF IRSA=1, AT LEAST ONE  *
C*                OF THE VARIABLES HAS A VALUE WHICH DOES NOT SATISFY   *
C*                ITS PERMISSIBLE RANGE; OTHERWISE IRSA=0;              *
C*      MA1     = COUNTER FOR THICKNESS, GRADE OR DENSITY; RELATIVED    *
C*                TO IRSA;                                              *
C*      MN      = COUNTER OF TOTAL INTERSECTIONS;                       *
C*      IOTR    = ARRAY REPRESENTING THE TYPE OF RESERVE INDICATOR      *
C*                (MAXIMUM OF 15 TYPES);                                *
C*                                                                      *
```

```
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C******VARIABLE DIMENSIONS                                                    *
C*                                                                           *
C*      K1      - NUMBER OF INDICATORS IN Y (NY).                            *
C*      K2      - NUMBER OF INDICATORS IN X (NX).                            *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C******EXECUTION                                                              *
C*                                                                           *
C*      H2010,CM70000,T200,I0400,P2.                                         *
C*      ACCOUNT,*****.                                                       *
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.                       *
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2010,                                   *
C*      Q1=K1, NUMBER OF INDICATORS IN Y (NY).                               *
C*              IF (NY=0) Q1=1,                                              *
C*      Q2=K2, NUMBER OF INDICATORS IN X (NX).                               *
C*              IF (NX=0) Q2=1.                                              *
C*      PFNI=                        ,(PERMANENT FILE INPUT NAME, CREATED BY *
C*                                     PROGRAM MEG0100)                      *
C*      PFNI2=                       ,(PERMANENT FILE NAME OF TYPE OF RESERVE *
C*                                    INDICATORS, TAPE5) IFREF=0.            *
C*      PFNO=                        .(PERMANENT FILE OUTPUT NAME OF MEG2010) *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C******DECLARATION OF VARIABLES                                               *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C*                                                                           *
      REAL    METAL1,LATIT1,LATIT,LAT,GRADEX(7),V1(15),V2(15)
      INTEGER REEF(10),TE1,IV(15),MIDX(7),METALX(7),HTN(8),IBLOC(K1,K2)
      INTEGER IOTR(15)
C*                                                                           *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C******MAIN-LINE PROGRAM BODY                                                 *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C******INITIALIZATION
C*
      CMTON=0.90718
      CPU=0.042401
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

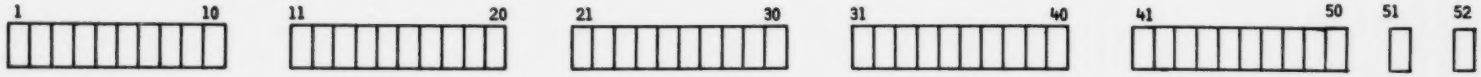
MEG2010 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 of 3
NAME _____

CARD NO. 1

DIMX | DIMY | TONFAC | ELEVTOP | ELEVBOT | ISDI | TEI



FORMAT(5F10.0,I1,R1)

CARD NO. 2

K | N | (IOTR(I),I=1,15) | IFREE | NX | NY | XREF | YREF

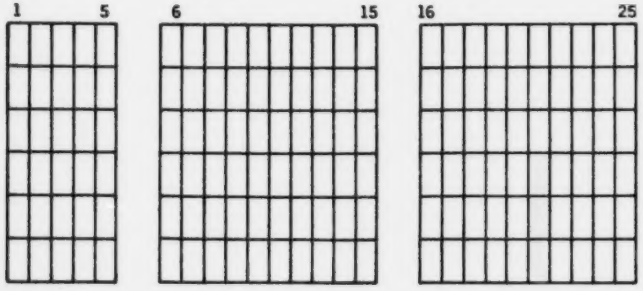
FORMAT(2I5,15I2,3I5,2F10.0)

CARD NO. 3

IV(J) | V1(J) | V2(J)

MAXIMUM OF 15 CARDS

FORMAT(I5,2F10.3)



MEG2010 - OPTION CARDS

VERSION NO. 1
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DATE _____
PAGE 2 OF 3
NAME _____

CARD NO. 4

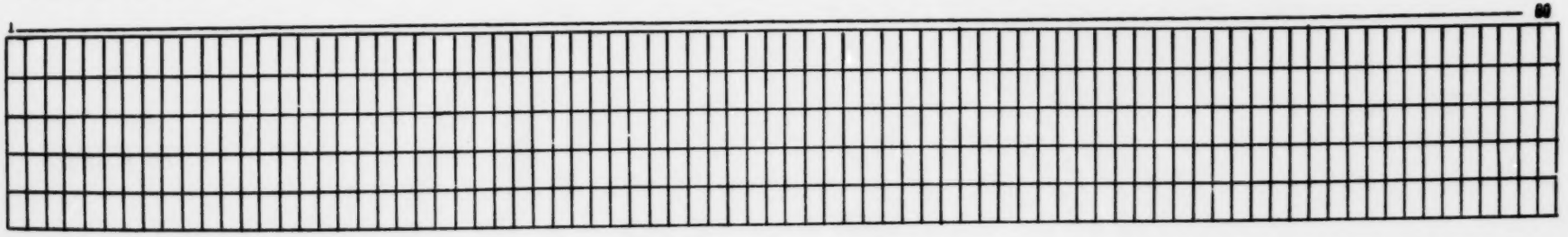
(REEF(J),J=1,N) FORMAT(10R3)

CARD NO. 5

HTN FORMAT(8A10)

CARD NO. 6

((IBLOC(I,J),J=1,NX),I=1,NY)



FREE FORMAT (IFREE=1)
OR CODED FORMAT HTN(IFREE=0)

MEG2010 - OPTION CARDS

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MAY, 1982

DATE _____
PAGE 3 OF 3
NAME _____

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM, PROCD,PROGRAMIN=MEG2010,
PFNI=                    ,(PERMANENT FILE NAME OF INPUT FILE (MEG0100)
PFNO=                    ,(PERMANENT FILE NAME OF OUTPUT FILE (MEG2010)
Q1=     ,Q2=     .
```

CHAPTER 3.0
EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2010 - OPTION CARDS

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MAY, 1982

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PAGE 1 of 3
NAME

CARD NO. 1

DIMX	DIMY	TONFAC	ELEVTOP	ELEVBOT	ISDI	TEI
1-10	11-20	21-30	31-40	41-50	51	52
5.0	5.0	12.0	1300.0	-500.0	0	0

FORMAT(5F10.0,I1,R1)

CARD NO. 2

K	N	(IOTR(I),I=1,15)	IFREE	NX	NY	XREF	YREF
1-5	6-10	11-40	41-45	46-50	51-55	56-65	66-75
2	2						

FORMAT(2I5,15I2,3I5,2F10.0)

CARD NO. 3

IV(J)	V1(J)	V2(J)
1-5	6-15	16-25
1	0.0	5.0
2	0.0	2.0

MAXIMUM OF 15 CARDS

FORMAT(I5,2F10.3)

MEG2010 - OPTION CARDS

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MAY, 1982

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PAGE 2 OF 3
NAME RS

CARD NO. 4
(REEF(J),J=1,N) FORMAT(10R3)

1 — 3	4 — 6	7 — 9	10 — 12	13 — 15	16 — 18	19 — 21	22 — 24	25 — 27	28 — 30
M	K								

CARD NO. 5 (NOT USED)
HTN FORMAT(8A10)

1 ——— 80

CARD NO. 6 (NOT USED)
((IBLOC(I,J),J=1,NX),I=1,NY)

1 ——— 80

FREE FORMAT (IFREE=1)
OR CODED FORMAT HTN(IFREE=0)

13

MEG2010 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 10-9-82
PAGE 3 OF 3
NAME RS

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM, PROCD,PROGRAMIN=MEG2010,
PFNI=MEG0100ZZX ,(PERMANENT FILE NAME OF INPUT FILE (MEG0100)
PFNO=(NOT USED)      ,(PERMANENT FILE NAME OF OUTPUT FILE (MEG2010)
Q1= /  ,Q2= /  .
```

```
      PROGRAM GFM2010(INPUT,OUTPUT,TAPE1=INPUT,TAPE2=OUTPUT,TAPE3,
     -                TAPE4,TAPE5)
      INTEGER IALOC(1,1)
C*
C*    K1 IS THE NUMBER OF INDICATORS IN Y (NY). IF (NY=0) K1=1.
C*    K2 IS THE NUMBER OF INDICATORS IN X (NX). IF (NX=0) K2=1.
C*
      K1=1
      K2=1
      CALL MFG2010(IALOC,K1,K2)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	DIMX=	5.00000	DIMENSIONS OF THE ZONE OF INFLUENCE FOR DRILL-HOLE COMPOSITE:
	DIMY=	5.00000	
	TONFAC=	12.0000	TONNAGE FACTOR:
	ELEVTOP=	1300.00	RANGE OF ACCEPTABLE ELEVATIONS FOR MIDPOINTS OF ECONOMICAL INTERSECTIONS:
	ELEVBOT=	-500.00	
	ISDI=	0	OPTION TO PRINT ADDITIONAL INFORMATION OF COMPOSITE INTERSECTIONS (INTER.)
	TEI=	D	TYPE OF INTERSECTION READ BY THE PROGRAM D FOR DILUTED, E FOR ECONOMICAL AND M FOR MINED-OUT INTERSECTIONS
2	K=	2	NUMBER OF LIMITING VALUES FOR THE THICKNESS, GRADE OR DENSITY:
	N=	2	NUMBER OF MINERALIZATION ZONES CONSIDERED:
	ICTR=	0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 TYPE OF RESERVE INDICATORS:
	IFREE=	0	TYPE OF FORMAT FOR OPTION CARD NO.6 (IFREE=1 IS FREE FORMAT):
	NX=	0	NUMBER OF INDICATORS IN X(NX) AND IN Y(NY) FOR IRLOC:
	NY=	0	
	XREF=	0.0	COORDINATES OFREFERENCE POINTS FOR TYPE OF RESERVE INDICATORS
	YREF=	0.0	
3	IV(1)=	1	ELIMINATION RANGE VALUES FOR VARIABLES DENOTED BY IV: IV=1: THICKNESS IV=2: GRADE IV=3: DENSITY
	V1(1)=	0.00	
	V2(1)=	5.00	
3	IV(2)=	2	
	V1(2)=	0.00	
	V2(2)=	2.00	
4	REEF(1)=	M	IDENTIFICATION CODES FOR RESPECTIVE MINERALIZATION ZONES:
	REEF(2)=	K	

SECTION 2 - DETAILED RESULTS FOR EACH TOTAL ECONOMICAL INTERSECTIONS

DESCRIPTION OF THE VARIABLES

UDN - MFG DRILL HOLE NUMBER;
DEPT1 - AVERAGE DEPARTURE OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
LATIT1- AVERAGE LATITUDE OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
ELEVA1- AVERAGE ELEVATION OF ALL ECONOMICAL INTERSECTIONS IN THE DRILL HOLE;
THICK1- TOTAL PROJECTED THICKNESS OF ALL ECONOMICAL INTERSECTIONS ALONG THE DRILL HOLE;
GRADE1- WEIGTHED AVERAGE GRADE OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
DENS1 - WEIGTHED AVERAGE DENSITY OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
METAL1- TOTAL METAL OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
TON1 - TOTAL TONNAGE OF ALL INTERSECTIONS ALONG THE DRILL HOLE;
IRST - THICKNESS REJECTION INDICATOR; IF IRST=1, TOTAL INTERSECTION THICKNESS IS FOUND OUTSIDE OF PERMISSIBLE RANGE;
OTHERWISE IRST=0;
MT1 - COUNTER FOR UNREJECTED TOTAL THICKNESS INTERSECTION;
IRSG - GRADE REJECTION INDICATOR; IF IRSG=1, TOTAL INTERSECTION GRADE IS FOUND OUTSIDE OF PERMISSIBLE RANGE;
OTHERWISE IRSG=0;
MG1 - COUNTER FOR UNREJECTED TOTAL THICKNESS INTERSECTION;
IRSM - DENSITY REJECTION INDICATOR; IF IRSM=1,TOTAL INTERSECTION DENSITY IS FOUND OUTSIDE OF PERMISSIBLE RANGE;
OTHERWISE IRSM=0;
MM1 - COUNTER FOR UNREJECTED WEIGHTED AVERAGE DENSITY OF TOTAL INTERSECTION;
IRSA - OVERALL REJECTION INDICATOR; IF IRSA=1, AT LEAST ONE OF THE VARIABLES HAS A VALUE WHICH DOES NOT SATISFY
ITS PERMISSIBLE RANGE; OTHERWISE IRSA=0;
MA1 - COUNTER FOR THICKNESS, GRADE OR DENSITY; RELATIVED TO IRSA;
MN - COUNTER OF TOTAL INTERSECTIONS;

UDN	DEPTI	LATITI	ELEVÂI	THICKI	DENSI	GRADEI	METALÎ	TONI	IPST	MTI	IPSG	MGI	IPSW	MWÎ	IPSA	MAÎ	MN
ZZX0009	20759.8	3273.7	-274.0	20.0	.0833	3.292	5.487	1.6447	0	1	0	1	0	1	0	1	1

SECTION 7 - RESERVE ESTIMATION USING EQUAL UNIT AREA OF INFLUENCE

SUMMARY FOR ALL RESERVE TYPES

		IMPERIAL UNITS		METRIC UNITS	
ORE TONNAGE	=	42.	TONS	38.	TONNES
AVERAGE GRADE	=	3.2920	LBS U3O8/TON	.1396	G U
METAL	=	137.	LBS U3O8	59.	KG U
AVERAGE THICKNESS	=	20.0	FEET	6.1	METERS

REFERENCES

1. Sabourin, R.L., "Program MEG0100 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-101(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

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Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
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PROGRAM MEG3000 USER'S GUIDE - GEM SYSTEM -
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

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Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal reporting purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

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PROGRAM MEG3000 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R. Boyle* and R.L. Sabourin**

ABSTRACT

The purpose of program MEG3000 is to generate a visual projection of drillholes on a plane which can be located anywhere in space. Drillhole segments within a volume are projected orthogonally on a specified face of that volume. Information pertaining to individual drillhole segments such as grade, density, rock code, zone code, can also be plotted beside each segments either using an alphanumeric format or a profile. The input files of MEG3000 are provided by MEG1000 or MEG1600 and optionnally by MEG0100.

MEG3000 is not limited to only one situation, which is the case with many plotting programs, but can deal with a multitude of situations. It can draw a plan, as well as a cross-section, a longitudinal section or even an inclined section. The many and varied options should help the geologist or mining engineer to solve a particular plotting problem in connection with reserve calculation.

The documentation of this program is technical and subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG3000
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R. Boyle* and R.L. Sabourin**

RÉSUMÉ

Le but du programme MEG3000 est de produire une projection visuelle de forages sur un plan qui peut avoir toutes les orientations possibles. Les segments de forages à l'intérieur d'un volume sont projetés orthogonalement toujours par rapport à un plan spécifique de ce volume. L'information reliée à chacun de ces segments tels que la teneur, la densité, le code pour le type de roche, le code pour une zone minéralisée peut aussi être dessinée près de chaque segment soit en utilisant un format alphanumérique ou un profil.

Les fichiers d'entrées de MEG3000 sont fournis par MEG1000 ou MEG1600 et optionnellement par MEG0100. L'utilisateur pourra aussi fournir son propre fichier d'entrée lorsqu'un plan donnant la position des sondages ainsi que la valeur de certaines variables est désiré.

MEG3000 n'est pas limité à dessiner une seule situation, ce qui est le cas de beaucoup de programme de traçage, mais peut traiter une multitude de cas. MEG3000 peut dessiner un plan ainsi que des sections transversales et longitudinales ou des sections inclinées. Les multiples options devraient aider le géoloque ou l'ingénieur minier à résoudre facilement un problème particulier de traçage relié au calcul des réserves.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      PROGRAM MEG3000 (INPUT,OUTPUT,TAPE30,TAPE1=INPUT,TAPE2=OUTPUT,
     -                 TAPE3,TAPE4,TAPE5,TAPE7,TAPE8,TAPE9,TAPE10)
C*
C*
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C******GENERAL DESCRIPTION                                                   *
C*                                                                           *
C*    GENERATES A VISUAL PROJECTION (PLOT) OF DRILL-HOLES ONTO A             *
C*    PLANE WHICH CAN BE LOCATED ANYWHERE IN SPACE. INFORMATION              *
C*    PERTAINING TO INDIVIDUAL DRILL-HOLE SEGMENTS SUCH AS GRADE,            *
C*    DENSITY, ROCK CODE, ZONE CODE ETC..., CAN ALSO BE PLOTTED.             *
C*    SELECTED DATA OF VARIOUS MEG'S PROGRAM OUTPUT FILES (TYPICALLY         *
C*    MEG1000, MEG1600 OR MEG0100) ARE PLOTTED BY CALCOMP PLOTTER.           *
C*    THE OUTPUT GRAPHICS CAN ALSO BE VIEWED ON TEKTRONIX TERMINAL,          *
C*    WITH HARD COPY OPTIONALLY PLOTTED BY THE CALCOMP PLOTTER.              *
C*                                                                           *
C*    1. IF DATA FILE CHOSEN IS MEG1000 (OR MEG1600):  DRILL-HOLE            *
C*    COLLAR POSITION AND OPTIONALLY EACH SEGMENT WITH MINERALIZED           *
C*    ZONE AND ROCK CODES AND A MAXIMUM OF 3 PROFILES CAN BE PLOTTED.        *
C*                                                                           *
C*    2. IF DATA FILES CHOSEN ARE BOTH MEG1000 (OR MEG1600) AND              *
C*    MEG0100:  ECONOMICAL INTERSECTIONS OF MEG0100 CAN BE PLOTTED           *
C*    AS WELL AS ABOVE INFORMATION (1).                                      *
C*                                                                           *
C*    DRILL-HOLE SEGMENTS WITHIN A SPECIFIED VOLUME (BLOCK) ARE              *
C*    PROJECTED ORTHOGONALLY ON FACE "A" OF THAT VOLUME. FACE "A" OF         *
C*    THE BLOCK IS THE SURFACE THAT WILL BE ULTIMATELY PLOTTED BY THE        *
C*    CALCOMP PLOTTER OR VIEWED ON THE TEKTRONIX. THE BLOCK DIMENSIONS       *
C*    ARE DEFINED BY ITS THREE SIDES DX, DY, DZ. ITS POSITION IN SPACE       *
C*    IS DEFINED BY A TRANSLATION POINT XT, YT, ZT AND THREE ANGLES OF       *
C*    ROTATION (ALFA, BETA, GAMMA).                                          *
C*    THE BLOCK'S ORIGIN IS TRANSLATED BY XT,YT AND ZT. THE BLOCK            *
C*    IS THEN ROTATED BY KEEPING THE BLOCK'S ORIGIN IN A FIXED               *
C*    POSITION. THE BLOCK CAN TAKE ANY POSITION IN SPACE BY THREE            *
C*    SIMPLE ROTATIONS. A FIRST ROTATION WILL USE THE Z AXIS OF THE          *
C*    BLOCK AS A PIVOT AXIS. THE TWO SIDES DX AND DY WILL BE ROTATED         *
C*    BY AN ANGLE ALFA. A SECOND ROTATION (BETA) WILL USE THE X AXIS         *
C*    AS A PIVOT AXIS AFTER A ROTATION ALFA HAS BEEN PERFORMED. THE          *
C*    SIDES DY AND DZ WILL THEN BE ROTATED BY AN ANGLE BETA. A THIRD         *
C*    ROTATION (GAMMA) AFTER ALFA AND BETA ROTATIONS WILL USE THE Y          *
C*    AXIS OF THE BLOCK AS A PIVOT AXIS. THE TWO SIDES DX AND DZ WILL        *
C*    BE ROTATED BY AN ANGLE GAMMA. POSITIVE AND NEGATIVE ROTATION           *
C*    ANGLES ARE REPRESENTED RESPECTIVELY BY COUNTER CLOCKWISE AND            *
C*    CLOCKWISE ROTATION.                                                    *
C*    SINCE FACE "A" OF THE VOLUME IS DEFINED AS THE SURFACE PLOTTED         *
C*    BY THE CALCOMP PLOTTER, IT IS PHYSICALLY DEFINED BY DX (LENGTH)        *
C*    AND DZ (WIDTH). ALL MEASUREMENTS ON THE GRAPHIC ARE IN IMPERIAL        *
C*    SYSTEM, (INCHES). THIS PROGRAM WAS WRITTEN USING CDC FORTRAN           *
C*    LEVEL 4.8 AND WAS ORIGINALLY CREATED BY RUSSELL BOYLE AND              *
C*    RAYMOND SABOURIN (EMR, CANMET, MRL), MAY 1982.                         *
C*                                                                           *
C******PROCEDURE FOR EXECUTION                                               *
C*    THE EXECUTION OF MEG3000 IS DONE WITH A CONTROL CARD LANGUAGE          *
C*    (CCL) PROCEDURE. THE USER MAY SELECT THE TYPE OF GRAPHICAL             *
C*    OUTPUT.                                                                *
```

```
C*      THE CCL PROCEDURE (BY USING A BEGIN CARD):                          *
C*                                                                          *
C*      H3000,CM120000,T400,IO1000,P2.          (JOB CARD)                  *
C*      ATTACH PROCD,MEGFXECCADD,ID=MEGPR,PW=***,MR=1. (MEG PROCEDURE)      *
C*      BEGIN,CADD,PROCD,PROGRAMIN=XXXXXXXXXX,                              *
C*           PFNI=           ,                                              *
C*           PFNI2=          ,                                              *
C*           PFNI3=          ,                                              *
C*           PFNI4=          ,                                              *
C*           PFNO=           .                                              *
C*      7/8/9                                                               *
C*           OPTION DATA                                                    *
C*      6/7/8/9                                                             *
C*                                                                          *
C*      THE BEGIN CARD OPTIONS:                                             *
C*      PROGRAMIN GIVES THE TYPE OF GRAPHICAL OUTPUT.                       *
C*      IF PROGRAMIN=PLOTPEN     -THE GRAPHIC IS DRAWN BY THE CALCOMP       *
C*                                PLOTTER WITH NIB PENS. (GOOD QUALITY      *
C*                                PLOT).                                    *
C*      IF PROGRAMIN=PLOTNOPEN   -THE GRAPHIC IS DRAWN WITH BALL POINT      *
C*                                PENS.                                     *
C*      IF PROGRAMIN=DISKPLOT    -DISK FILE WITH LOGICAL FILE NAME TAPE30   *
C*                                CONTAINING ALL THE PLOTTING COMMANDS IS   *
C*                                CATALOGUED UNDER PFNO.                    *
C*                                (NO ACTUAL PLOTTING IS DONE YET).         *
C*      IF PROGRAMIN=TEKTRONIX   -THIS OPTION IS USED TO VIEW A DISK PLOT   *
C*                                WITH A TEKTRONIX TERMINAL SERIES 4000.    *
C*                                PFNI= IS THE DISKPLOT LFN=(TAPE30)        *
C*                                PREVIOUSLY CATALOGUED AS PFNO.            *
C*      IF PROGRAMIN=PLOTDPEN    -THE GRAPHIC ON FILE LFN=(TAPE30) IS       *
C*                                DRAWN BY THE CALCOMP PLOTTER. PFNI= IS    *
C*                                TAPE30. THE PLOT IS TRACED WITH NIB       *
C*                                PENS.                                     *
C*      IF PROGRAMIN=PLOTDNOPEN -THE GRAPHIC ON FILE TAPE30 IS DRAWN        *
C*                                BY THE CALCOMP PLOTTER. PFNI= IS          *
C*                                TAPE30. THE PLOT IS TRACED WITH BALL      *
C*                                POINT PENS.                               *
C*      IF PROGRAMIN=PLOTPEN, PLOTNOPEN OR DISKPLOT, PFNI REFERS TO THE     *
C*      OUTPUT OF MEG1000 OR MEG1600. IT REFERS TO TAPE30 IN THE OTHER      *
C*      CASES (PLOT COMMANDS).                                              *
C*      PFNI3, PFNI4 REFER TO FILES CREATED BY THE USER. (REFER TO IR13,    *
C*      IP2). IF OPTION IR1=1 ONLY PFNI SHOULD BE SPECIFIED ON BEGIN        *
C*      CARD. IF OPTION IR1=2 BOTH PFNI AND PFNI2 SHOULD BE SPECIFIED.      *
C*      PFNI2 ALWAYS REFERS TO THE OUTPUT FILE MEG0100, IF OPTION IR1=2.    *
C*      PFNI3 IS ONLY USED WITH OPTION IR13 AND IP1 (IP1.GT.0). THIS        *
C*      OPTION READS FROM DISK FILE AND PLOTS THE VARIABLES BESIDE THE      *
C*      DRILL HOLE COLAR LOCATION.                                          *
C*      PFNI4 IS ONLY USED WITH OPTION IP2 GT 0 . THIS OPTION READS FROM    *
C*      DISK FILE AND PLOTS THE DEPOSITS LIMITS AND SHAFTS.                 *
C*                                                                          *
C******HARDWARE/SOFTWARE                                                   *
C*      THIS GRAPHICAL APPLICATION PROGRAM NEEDS SPECIAL HARDWARE AND       *
C*      SOFTWARE.                                                           *
C*      HARDWARE REQUIREMENTS ARE:                                          *
C*          CALCOMP 1051 DRUM PLOTTER.                                      *
C*          TEKTRONIX GRAPHICAL TERMINAL 4000 SERIES (OPTIONAL).            *
C*      SOFTWARE REQUIREMENTS ARE:                                          *
```

```
C*          CALCOMP COMPATIBLE ROUTINES (FORTRAN CALL ROUTINES),          *
C*          TEKTRONIX PLOTTING SOFTWARE (SUPPORTED BY THE COMPUTER        *
C*          SCIENCE CENTER) (OPTIONAL).                                   *
C*                                                                        *
C************************************************************************
C*
C*
C************************************************************************
C*                                                                        *
C*                                                                        *
C******OPTIONS READ ON INPUT                                             *
C*                                                                        *
C*      CARD 1 - IBR,IMETR                                                *
C*               FORMAT(2I3)                                              *
C*           IBR    - BAUD RATE. THE BAUD RATE IS A DATA TRANMISSION      *
C*                    RATE IN CHARACTERS PER SECOND.                      *
C*                    IBR IS USED TO VIEW A PLOT ON A TEKTRONIX.          *
C*                    IBR=480 IS USED FOR THE TEKTRONIX(PROGRAMIN=TEKTRO-*
C*                    NIX) AT BELLS CORNERS COMPLEX, BLDG 10.             *
C*                    IBR=960 IS USED FOR THE TEKTRONIX AT 58A BOOTH ST.  *
C*                    THE POSSIBLE VALUES FOR IBR ARE 30, 120, 480, 960.  *
C*                    DEFAULT VALUE IS 480.                               *
C*           IMETR  - OPTION TO CONVERT COLLARS AND SEGMENT COORDINATES    *
C*                    FROM ALL FILES PROCESSED (MEG1000 OR MEG1600,       *
C*                    MEG0100, USER CREATED FILES)                        *
C*                    IF IMETR=0 DEFAULT NO CONVERTION DONE.              *
C*                    IF IMETR>0 CONVERTION TO METRIC                     *
C*                                                                        *
C*      CARD 2 - ITIT                                                     *
C*               FORMAT READ IS (3A10)                                    *
C*           ITIT   - TITLE IN THE LEGEND BOX.                            *
C*                    A MAXIMUM OF 30 CHARACTERS ARE PERMITTED.           *
C*                                                                        *
C*      CARD 3 - ISERIE,IR1,IR3,IR4,IR5,R6X,R6Z,ITHICK,IR25,IR8,IR9,      *
C*               R10,IR23,IR12,ICS,IR14,IR15,IR16,IRO,IR18,IR20,          *
C*               FORMAT READ IS (R3,4I2,2F6.0,R1,3I4,F4.0,2I4,I2,3I4,R1,*
C*                               2I4)                                     *
C*           ISERIE - MEG SERIAL CODE OF INPUT DATA FILE(S). (MEG1000,    *
C*                    MEG1600 OR MEG0100).                                *
C*           IR1    - CODE FOR THE TYPE OF INPUT FILE(S). (I2)            *
C*                    IF IR1=0 OR BLANK, THE INPUT FILE IS A USER GREATED*
C*                       FILE (INPUT CARDS, PFNI3, PFNI4) AND OPTION IR13*
C*                       (CARD 11) OR/AND IP2 (CARD 13) SHOULD BE         *
C*                       SPECIFIED. FILES CREATED BY PROGRAMS MEG1000,    *
C*                       MEG1600 AND MEG0100 ARE NOT USED.                *
C*                    IF IR1=1, MEG1000 OR MEG1600 OUTPUT FILE IS READ.   *
C*                       THE DRILL HOLE COLLAR AND SEGMENTS ARE PLOTTED.  *
C*                       OPTIONALLY THE ROCK TYPE AND/OR ZONE CODES ARE   *
C*                       PLOTTED FOR EACH SEGMENT. A MAXIMUM OF THREE     *
C*                       PROFILES CAN BE PLOTTED ON THE SAME PLOT.        *
C*                       INFORMATION STORED ON FILE MEG1000 (MEG1600) IS  *
C*                       PLOTTED DEPENDING ON THE OPTIONS SELECTED.       *
C*                    IF IR1=2, OUTPUT FILES MEG1000 (OR MEG1600) AND     *
C*                       MEG0100 ARE READ. INFORMATION OF MEG1000         *
C*                       IS ALSO PLOTTED. IN ADDITION THE ECONOMICAL       *
C*                       INTERSECTIONS PROVIDED BY MEG0100 OUTPUT FILE    *
C*                       ARE GRAPHICALLY SHOWN.                           *
```

```
C*                IF IR1 GT 0 OPTION IR13 (CARD 11) AND OPTION IP2      *
C*                (CARD13) SHOULD BE SET TO 0.                          *
C*          IR3   - OPTION TO PLOT VARIOUS TYPES OF GRID                *
C*                IF IR3=0 OR BLANK (DEFAULT), POSITIVE SIGNS (+)       *
C*                   ARE PLOTTED AT THE PERIPHERY ONLY.                 *
C*                IF IR3=1, POSITIVE SIGNS (+) ARE PLOTTED AT THE       *
C*                   PERIPHERY AND INSIDE THE PLOT AREA.                *
C*                IF IR3=2, HORIZONTAL LINES ARE DRAWN IN ADDITION      *
C*                   TO OPTION 1 (IE. IR3=1). (THE LINES ARE DRAWN      *
C*                   AND THE POSITIVE SIGNS (IE. IR13=1)). (THE LINES   *
C*                   ARE DRAWN AT EVERY GRID DIVISION AS SPECIFIED      *
C*                   BY R6Z.                                            *
C*                IF IR3=3, VERTICAL LINES ARE DRAWN IN ADDITION TO     *
C*                   POSITIVE SIGNS (IR3=1). THE LINES ARE DRAWN AT     *
C*                   EVERY GRID DIVISION AS SPECIFIED BY R6Z.           *
C*                IF IR3=4, HORIZONTAL AND VERTICAL LINES ARE DRAWN     *
C*                   IN ADDITION TO 0, POSITIVE SIGNS AT THE            *
C*                   PERIPHERY (IE. IR3=0).                             *
C*                                                                      *
C*                   - SCALING PARAMETERS -                             *
C*                                                                      *
C*          IR4   - NUMBER OF GRID DIVISIONS ON THE HORIZONTAL AXIS OF  *
C*                THE PLOT (FACE A).                                    *
C*          IR5   - NUMBER OF GRID DIVISIONS ON THE VERTICAL AXIS OF    *
C*                THE PLOT (FACE A).                                    *
C*          R6X   - LENGTH (INCHES) OF ONE GRID DIVISION ON THE         *
C*                HORIZONTAL AXIS OF THE PLOT (FACE A).                 *
C*          R6Z   - LENGTH (INCHES) OF ONE GRID DIVISION ON THE         *
C*                VERTICAL AXIS OF THE PLOT (FACE A).                   *
C*                                                                      *
C*                IR4, IR5, R6X, R6Z ARE USED FOR SCALING IN THE        *
C*                FOLLOWING WAY:                                        *
C*                IR4*R6X/DX SCALE OF PLOT ON THE HORIZONTAL AXIS       *
C*                (IN/FEET)  OR (IN/METER) IF COORDINATES AND           *
C*                DISTANCES ARE SPECIFIED IN SI UNITS.                  *
C*                IR5*R6Z/DZ SCALE OF PLOT ON THE VERTICAL AXIS         *
C*                (IN/FEET) OR (IN/METER) IF COORDINATES AND            *
C*                DISTANCES ARE SPECIFIED IN SI UNITS.                  *
C*                DX AND DZ ARE THE HORIZONTAL AND VERTICAL             *
C*                DIMENSIONS OF FACE "A". DIMENSIONS OF FACE "A" ON     *
C*                THE CALCOMP PLOTTER WILL BE IR4*R6X AND IR5*R6Z       *
C*                RESPECTIVELY. DUE TO THE SIZE OF THE PLOTTING         *
C*                PAPER, THE MAXIMUM PERMITTED VERTICAL AND             *
C*                HORIZONTAL DIMENSIONS OF A PLOT PRODUCED BY THE       *
C*                CALCOMP PLOTTER IS 33.0 INCHES AND 300.0 FEET         *
C*                RESPECTIVELY. (RECOMMENDED: MAXIMUM HORIZONTAL        *
C*                (LENGTH) DIMENSION OF ONE PLOT SHOULD BE 36 INCHES)   *
C*                (REFER TO DX, DY, DZ IN CARD 5)                       *
C*          ITHICK - THIS OPTION IS USED WHEN IR1=2. IT REPRESENTS THE  *
C*                TYPE OF PROJECTION THICKNESS OF ECONOMICAL             *
C*                INTERSECTIONS TO BE DRAWN.                            *
C*                THE VALUE OF ITHICK SHOULD BE THE SAME AS PTYPE IN    *
C*                PROGRAM MEG0100.                                      *
C*                IF ITHICK=A APPARENT THICKNESS                        *
C*                IF ITHICK=V VERTICAL THICKNESS                        *
C*                IF ITHICK=H HORIZONTAL THICKNESS                      *
C*                IF ITHICK=T TRUE THICKNESS                            *
```

```
      C*          IR25   - OPTION TO ELEMINATE DRILL-HOLES WITHIN ONE OR MORE *
      C*                   ZONES. A DRILL-HOLE FOR WHICH ITS DRILL-HOLE COLLAR*
      C*                   FALLS WITHIN A SPECIFIED ZONE WILL BE COMPLETLY     *
      C*                   ELIMINATED. IR25 REPRESENTS THE NUMBER OF ZONES.    *
      C*                   A MAXIMUM OF 10 ZONES CAN BE SPECIFIED. (SEE OPTION*
      C*                   CARD 12).                                           *
      C*                   DEFAULT IR25=0, NO ELIMINATION.                     *
      C*          IR8    - CODE TO PLOT A PROFILE AT A GIVEN ANGLE (SEE       *
      C*                   OPTION R10). (I2)                                   *
      C*                   IF IR8=0 OR BLANK (DEFAULT), NO PROFILES PLOTTED.   *
      C*                   IF IR8=1, PROFILE PLOTTED AT A GIVEN ANGLE          *
      C*                      SPECIFIED AS OPTION R10.                         *
      C*                   IF IR8=2, PROFILE PLOTTED AT 90 DEGREES TO THE      *
      C*                      DRILL HOLE SEGMENT.                              *
      C*                   OTHER VARIABLES PERTAINING TO PLOTTING PROFILES     *
      C*                   ARE:  R10, IR21, R7, R7M, R13, IR9.                 *
      C*          IR9    - OPTION USED ONLY WHEN IR8.GT.0. (I2)               *
      C*                   OPTION ALLOWING THE ACTUAL VALUES OF PROFILES TO    *
      C*                   BE WRITTEN WHEN THE VALUE EXCEEDS THE MAXIMUM       *
      C*                   ACCEPTABLE LIMIT FOR A PROFILE (SEE OPTION R7).     *
      C*                   IF IR9=0 OR BLANK (DEFAULT), NO VALUES ARE WRITTEN  *
      C*                      WHEN THE VARIABLE EXCEEDS R7.                    *
      C*                   IF IR9.GE.1, THE ACTUAL NUMERICAL VALUE IS WRITTEN  *
      C*                      WITH IR9 DIGITS AFTER THE DECIMAL POINT.         *
      C*          R10    - CARTESIAN ANGLE IN DEGREES AT WHICH PROFILES AND   *
      C*                   OTHER INFORMATION WILL BE PLOTTED. (F6.0)           *
      C*          IR23   - CODE TO PLOT (IN/OUT) SIGNS WHENEVER A DRILL HOLE  *
      C*                   ENTERS AND/OR LEAVES THE BLOCK. (I2)                *
      C*                   IF IR23=0 OR BLANK (DEFAULT), IN/OUT SIGNS ARE      *
      C*                      PLOTTED.                                         *
      C*                   IF IR23=1, IN/OUT SIGNS ARE NOT PLOTTED.            *
      C*          IR12   - OPTION TO PLOT THE DRILL HOLE COLLAR SYMBOL, NAME  *
      C*                   AND SEGMENTS. (I2)                                  *
      C*                   THE HOLE COLLAR IS REPRESENTED WITH A SYMBOL.       *
      C*                   THE DRILL HOLE NAME IS PLOTTED WITH ONE OF, OR A    *
      C*                   COMBINATION OF:                                     *
      C*                   A) THE MEG CODE: THE FIRST 3 CHARACTERS ARE THE     *
      C*                      SERIAL CODE. THE 4 LAST DIGITS REPRESENT THE     *
      C*                      MEG HOLE NUMBER (ZZZ0035).                       *
      C*                   B) THE COMPANY HOLE NAME: A MAXIMUM OF 7            *
      C*                      CHARACTERS AS ASSIGNED BY THE COMPANY.           *
      C*                   C) THE SPECIAL IDENTIFICATION CODES AS ASSIGNED     *
      C*                      BY MEG.                                          *
      C*                   THE DRILL HOLE NAME IS PLOTTED IN THE VICINITY OF   *
      C*                   THE COLLAR SYMBOL. IF THE COLLAR IS NOT WITHIN      *
      C*                   THE BLOCK, THE HOLE NAME IS PLOTTED WITH THE FIRST  *
      C*                   AND NEAREST COLLAR SEGMENT INTERSECTING THE BLOCK.  *
      C*                   IF IR12=0 OR BLANK (DEFAULT), THE MEG SERIAL AND    *
      C*                      NUMBER ARE WRITTEN (ZZZ0035) PARALLEL TO THE     *
      C*                      FIRST HOLE SEGMENT.                              *
      C*                      THE STANDARD COLLAR SYMBOL PLOTTED IS AN         *
      C*                      HEXAGON.                                         *
      C*                   IF IR12=1, ONLY THE MEG HOLE NUMBER IS PLOTTED.     *
      C*                      ZZZ0035 BECOMES 35. (IE. MEG SERIAL CODES ARE    *
      C*                      OMITTED).                                        *
      C*                   IF IR12=2, THE COMPANY DRILL HOLE NUMBER IS         *
      C*                      PLOTTED.                                         *
```

```
C*                    (REFER TO THE MEG CODING GUIDE FOR ADDITIONAL   *
C*                    INFORMATION ABOUT THE COMPANY NUMBER).          *
C*                  IF IR12=3, THE MEG HOLE NUMBER AND COMPANY HOLE   *
C*                    NUMBER ARE PLOTTED. THIS OPTION IS EQUIVALENT TO*
C*                    A COMBINATION OF IR12=1 AND 2.                  *
C*                  IF IR12=4, THE SPECIAL IDENTIFICATION IS PLOTTED. *
C*                    (REFER TO THE MEG CODING GUIDE FOR ADDITIONAL   *
C*                    INFORMATION ABOUT THE SPECIAL IDENTIFICATION).  *
C*                  IF IR12=5, THE 4 FIRST CHARACTERS OF THE MEG      *
C*                    SPECIAL IDENT. ARE PLOTTED.                     *
C*                  IF IR12=6, THE MEG HOLE NUMBER AND 4 FIRST        *
C*                    CHARACTERS OF THE SPECIAL IDENT. ARE PLOTTED.   *
C*                    THIS OPTION IS EQUIVALENT TO A COMBINATION OF   *
C*                    IR12=1 AND 4.                                   *
C*                  IF IR12=8, ONLY COLLAR AND MEG HOLE NUMBER ARE    *
C*                    PLOTTED. SEGMENTS, PROFILES ETC ARE NOT PLOTTED.*
C*                    (IE. NO DRILL HOLE PROJECTION IS PLOTTED).      *
C*                  IF IR12=9 NO DDH NUMBER IS PLOTTED                *
C*                    ONLY THE POSITION OF THE COLLAR IS PLOTTED      *
C*                  WHEN IR12.GT.0, THE COLLAR SYMROL IS OPTIONAL.    *
C*          ICS     - INTEGER CODE OF AN EQUIVALENT CALCOMP SPECIAL   *
C*                  SYMROL TO REPRESENT THE DRILL HOLE COLLAR.        *
C*                  IF ICS=0 OR BLANK (DEFAULT), SQUARE;              *
C*                  IF ICS=1, HEXAGONE;                               *
C*                  IF ICS=2, TRIANGLE;                               *
C*                  IF ICS=5, DIAMOND;                                *
C*                  IF ICS=11, ASTERIX.                               *
C*                  ONLY SPECIFY ICS WHEN IR12 GT 0.                  *
C*          IR14    - OPTION TO PLOT GRID LINES OTHER THAN THE ONES   *
C*                  DEFINED IN IR3. (I1)                              *
C*                  THE LINES ARE OPTIONALLY HORIZONTAL AND/OR        *
C*                  VERTICAL. THEY CAN ALSO BE PARALLEL TO THE        *
C*                  ELEVATION, DEPARTURE OR LATITUDE.                 *
C*                  CARD 7 IS REQUIRED IF THIS OPTION IS CHOSEN.      *
C*                  IF IR14=0 OR BLANK (DEFAULT), NO SUPPLEMENTARY    *
C*                    LINES ARE PLOTTED.                              *
C*                  IF IR14.GE.1, SUPPLEMENTARY LINES ARE PLOTTED IN  *
C*                    THE GRID.CARD 7 MUST BE SPECIFIED.              *
C*          IR15    - OPTION TO PLOT OR NOT TO PLOT GROUPS OF DRILL-HOLES*
C*                  SPECIFIED ON CARD 8.                              *
C*                  IR15 REPRESENTS THE NUMBER OF GROUPS OF DRILL HOLES*
C*                  A GROUP OF DRILL-HOLES IS DEFINED AS              *
C*                  A LIST OF MEG HOLE NUMBERS IN ASCENDING ORDER WITH*
C*                  THE INITIAL AND FINAL NUMBERS SPECIFIED.          *
C*                  IF IR15=0 OR BLANK (DEFAULT), ALL HOLES           *
C*                    (INTERSECTING THE BLOCK) ON SELECTED FILE(S)    *
C*                    ARE PLOTTED BY THE CALCOMP PLOTTER.             *
C*                  IF IR15.GE.1, THE SPECIFIED GROUPS OF DRILL HOLES *
C*                      WILL BE PLOTTED. CARD 8 MUST BE SUPPLIED      *
C*                    IF IR15.LE.-1,THE SPECIFIED GROUPS OF           *
C*                      DRILL-HOLES WILL NOT BE PLOTTED. CARD 8 MUST  *
C*                      BE SUPPLIED                                   *
C*          IR16    - OPTION TO PLOT PARALLEL SECTIONS OR PLANS.      *
C*                  THE DISTANCE (DX,DY,DZ) BETWEEN THE TRANSLATION   *
C*                  POINTS OF BLOCKS IS CONSTANT. THIS OPTION IS GOOD *
C*                  WHEN DISTANCES BETWEEN TRANSLATION POINTS (XT,YT, *
C*                  ZT) OF BLOCKS IS CONSTANT. THIS OPTION IS USEFULL *
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C*                    FOR EXAMPLE WHEN PARALLEL SECTIONS OR PLANS MUST   *
C*                    BE DRAWN (I1) .                                    *
C*                    ALL PRODUCED PLOTS WILL HAVE THE SAME OPTIONS.     *
C*                    IF IR16=0 OR BLANK (DEFAULT), NO EXTRA PLOTS       *
C*                       PRODUCED.                                       *
C*                    IF IR16.GT.0, IS THE NUMBER OF NEW TRANSLATION     *
C*                       POINT(S) TO BE COMPUTED. A MAXIMUM OF 20        *
C*                       TRANSLATION POINTS MAY BE COMPUTED.             *
C*                       THE NEW BLOCKS ARE TRANSLATED AFTER THE         *
C*                       ROTATIONS OF THE FIRST BLOCK.                   *
C*                       THE DIRECTION OF TRANSLATION IS SPECIFIED IN    *
C*                       VARIABLE IRO. THE TRANSLATIONS ARE ALWAYS       *
C*                       PERFORMED ALONG THE POSITIVE AXIS X+ OR Y+ OR Z+*
C*                       OF THE NEW REFERENCE SYSTEM VARIABLE "NO"       *
C*                       (CARD 5) MUST BE SET TO 0.                      *
C*                       (REFER TO VARIABLE IRO).                        *
C*           IRO      - OPTION USED WHEN IR16.GE.1. (R1)                 *
C*                    DIRECTION OF THE TRANSLATION IN THE NEW REFERENCE  *
C*                    SYSTEM                                             *
C*                    IF IRO=X, TRANSLATION IS ALONG THE X POSITIVE AXIS.*
C*                    IF IRO=Y, TRANSLATION IS ALONG THE Y POSITIVE AXIS.*
C*                    IF IRO=Z, TRANSLATION IS ALONG THE Z POSITIVE AXIS.*
C*           IR18     - OPTION TO PLOT ROCK TYPE, ZONE CODE OR BOTH. (I1)*
C*                    THE INFORMATION IS PLOTTED FOR EACH SEGMENT WITHIN *
C*                    THE BLOCK. THE ANGLE IS SPECIFIED BY IR8 OR R10.   *
C*                    IF IR18=0 OR BLANK (DEFAULT), ROCK TYPE AND ZONE   *
C*                       CODE ARE NOT PLOTTED.                           *
C*                    IF IR18=1, ROCK TYPE IS PLOTTED.                   *
C*                    IF IR18=2, ZONE CODE IS PLOTTED.                   *
C*                    IF IR18=3, BOTH ROCK TYPE AND ZONE CODE ARE        *
C*                       PLOTTED.                                        *
C*                    (REFER TO THE MEG CODING GUIDE FOR FURTHER         *
C*                    INFORMATION CONCERNING THE ROCK TYPE AND ZONE CODE)*
C*           IR20     - OPTION TO SHIFT ONE COORDINATE (X, Y OR Z) OF    *
C*                    THE COLLAR AND ALL SEGMENTS OF A DRILL-HOLE BY A   *
C*                    CONSTANT VALUE. (I1)                               *
C*                    IF IR20=0 OR BLANK (DEFAULT) THE COORDINATES OF    *
C*                       THE DRILL-HOLE SEGMENTS AND COLLAR ARE NOT      *
C*                       MODIFIED                                        *
C*                    IF IR20=1, THE COLLAR ELEVATION IS SET TO 0.0 AND  *
C*                       ALL SEGMENTS ELEVATIONS ARE ADJUSTED ACCORDINGLY*
C*                    IF IR20=2, THE DEPARTURE, LATITUDE OR ELEVATION OF *
C*                       EACH SEGMENT AND COLLAR ARE DIMINISHED BY A     *
C*                       CONSTANT VALUE. THIS CONSTANT VALUE WILL BE THE *
C*                       ELEVATION OF A GEOLOGICAL HORIZON ALREADY       *
C*                       IDENTIFIED BY PROGRAM MEG1000. THIS OPTION WAS  *
C*                       ALREADY SELECTED IN PROGRAM MEG1000 AND         *
C*                       IS USED TO SET A GEOLOGICAL HORIZON AT THE SAME *
C*                       ELEVATION OR DEPARTURE OR LATITUDE.             *
C*                       (REFER TO PROGRAM MEG1000, VARIABLE PGH).       *
C*                                                                       *
C*     CARD 4 - R7,R7M,IR11,R13,IR21                                     *
C*              FORMAT READ IS (6F5.0,3I1,2X,3F5.0,3I1)                  *
C*              IF IR8=0, THIS CARD IS NOT REQUIRED.                     *
C*              A MAXIMUM OF 3 PROFILES CAN BE PLOTTED.                  *
C*              EACH PROFILE WILL BE PLOTTED IN DIFFERENT COLOR.         *
C*         R7     - A MAXIMUM OF 3 VALUES CAN BE STORED IN ARRAY R7.     *
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C*                    (3F5.0)                                                  *
C*                    R7 REPRESENTS THE VALUES USED FOR PLOTTING               *
C*                    THE MAXIMUM VALUE OF THE PROFILES. VALUES ABOVE          *
C*                    THE R7 VALUE(S) ARE DRAWN ON THE GRAPHIC IF              *
C*                    IR9.GE.1                                                 *
C*          R7M     - A MAXIMUM OF 3 VALUES CAN BE STORED IN ARRAY R7M.        *
C*                    (3F5.0)                                                  *
C*                    R7M REPRESENTS THE MINIMUM VALUES BELOW WHICH            *
C*                    PROFILES ARE NOT PLOTTED                                 *
C*          IR11    - A MAXIMUM OF 3 VALUES CAN BE STORED IN ARRAY IR11.       *
C*                    (3I1)                                                    *
C*                    IR11 REPRESENTS THE PROFILE SCALE (LOG OR LINEAR).       *
C*                    IF IR11=0 OR BLANK (DEFAULT), PROFILE SCALE LINEAR.      *
C*                    IF IR11=1, PROFILE SCALE LOG BASE 10.                    *
C*          R13     - A MAXIMUM OF 3 VALUES CAN BE STORED IN ARRAY R13.        *
C*                    (3F5.0)                                                  *
C*                    R13 REPRESENTS THE MAXIMUM HEIGHT IN INCHES FOR A        *
C*                    PROFILE.                                                 *
C*          IR21    - A MAXIMUM OF 3 VALUES CAN BE STORED IN ARRAY IR21.       *
C*                    (3I1)                                                    *
C*                    IR21 REPRESENTS THE TYPES OF VARIABLES FROM FILE         *
C*                    MEG1000 (MEG1600) TO BE PLOTTED AS A PROFILE.            *
C*                    IF IR21=0 OR BLANK (DEFAULT), NO PROFILE PRODUCED.       *
C*                    IF IR21=1, U308 LB/TON GRADE VALUE PROFILE IS            *
C*                       PLOTTED.                                              *
C*                    IF IR21=2, THO2 LB/TON GRADE VALUE PROFILE IS            *
C*                       PLOTTED.                                              *
C*                    IF IR21=3, METAL 1 GRADE VALUE PROFILE IS PLOTTED.       *
C*                    IF IR21=4, METAL 2 GRADE VALUE PROFILE IS PLOTTED.       *
C*                    IF IR21=5, METAL 3 GRADE VALUE PROFILE IS PLOTTED.       *
C*                    IF IR21=6, METAL 4 GRADE VALUE PROFILE IS PLOTTED.       *
C*                    IF IR21=7, METAL 5 GRADE VALUE PROFILE IS PLOTTED.       *
C*                    IF IR21=8, ROCK CORE RECOVERY PLOTTED.                   *
C*                    IF IR21=9, ROCK DENSITY (DRY) PLOTTED.                   *
C*                    EACH PROFILE IS DEFINED BY R7(I), R7M(I),                *
C*                    IR11(I),R13(I),IR21(I).                                  *
C*     CARD 5 - XT,YT,ZT,DX,DY,DZ,ALFA,BETA,GAMMA,NO                           *
C*              FORMAT READ IS (6F10.0,3F5.0,I1)                               *
C*          XT      - DEPARTURE OF TRANSLATION POINT. (F10.0)                  *
C*          YT      - LATITUDE OF TRANLATION POINT. (F10.0)                    *
C*          ZT      - ELEVATION OF TRANSLATION POINT. (F10.0)                  *
C*                    THE LOWER LEFT FRONT CORNER OF THE BLOCK IS              *
C*                    TRANSLATED BY XT,YT AND ZT.                              *
C*          DX,DY,DZ - TO PROPERLY SELECT DX, DY, DZ WE MUST REMEMBER          *
C*                       THAT DX AND DZ ARE RESPECTIVELY THE HORIZONTAL        *
C*                       AND VERTICAL DIMENSIONS OF THE PLOTTED AREA           *
C*                       (FACE "A") DY IS THE THIRD DIMENSION (DEPTH) OF       *
C*                       THE BLOCK. IN SPACE THE BLOCK CAN BE DETERMINED       *
C*                       BY A TRANSLATION POINT AND THREE ANGLES OF            *
C*                       ROTATION. (SEE ACCOMPANIED FIGURE)                    *
C*          ALFA    - ROTATION ANGLE IN DEGREES ABOUT Z AXIS OF THE BLOCK*
C*          BETA    - ROTATION ANGLE IN DEGREES ABOUT X AXIS OF THE BLOCK*
C*          GAMMA   - ROTATION ANGLE IN DEGREES ABOUT Y AXIS OF THE BLOCK*
C*                    THE ORDER OF ROTATION IS AN ALFA, A BETA AND A           *
C*                    GAMMA ROTATION.                                          *
C*                    A POSITIVE ROTATION ANGLE IS COUNTER CLOCK WISE.         *
C*                    A NEGATIVE ROTATION ANGLE IS CLOCK WISE.                 *
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C*          NO      - NUMBER OF EXTRA PLOTS WITH SAME OPTIONS AT          *
C*                    DIFFERENT TRANSLATION POINTS. (I1)                  *
C*                    NO MUST BE .LE.9.                                   *
C*                    THE TRANSLATION COORDINATES ARE GIVEN IN CARD 9     *
C*                    (REFER TO CARD 9 AND CARD 12)                       *
C*      CARD 6 - IX5,DXL,IZ5,DZL,ZZ,ZVALUE,DZZ,NLINZ,XX,XVALUE,DXX,       *
C*               NLINX                                                    *
C*               FORMAT READ IS (2(I5,F10.0),2(R1,2F10.0,I2))             *
C*               THIS CARD IS NOT REQUIRED WHEN IR14=0 OR BLANK.          *
C*          IX5     - OPTION TO PLOT A VERTICAL LINE ON THE GRAPHIC AT A  *
C*                    GIVEN DEPARTURE. (I5)                               *
C*                    IF IX5=0 OR BLANK (DEFAULT), NO LINE PLOTTED.       *
C*                    IF IX5=1, VERTICAL LINE PLOTTED.                    *
C*          DXL     - OPTION USED WHEN IX5=1. (F10.0)                     *
C*                    DEPARTURE OF THE VERTICAL LINE.                     *
C*          IZ5     - OPTION TO PLOT AN HORIZONTAL LINE ON THE GRAPHIC AT *
C*                    A GIVEN ELEVATION.                                  *
C*                    IF IZ5=0 OR BLANK (DEFAULT), NO LINE PLOTTED.       *
C*                    IF IZ5=1, HORIZONTAL LINE PLOTTED.                  *
C*          DZL     - OPTION USED WHEN IZ5=1. (F10.0)                     *
C*                    ELEVATION OF HORIZONTAL LINE TO BE PLOTTED.         *
C*          ZZ      - OPTION TO PLOT LINES PARALLEL TO AND ABOVE A        *
C*                    SPECIFIC ELEVATION.                                 *
C*                    IF ZZ.NE.Z (DEFAULT), NO LINES PLOTTED.             *
C*                    IF ZZ=Z, LINES PLOTTED PARALLEL TO THE ELEVATION    *
C*                       ZVALUE.                                          *
C*          ZVALUE  - OPTION USED WHEN ZZ=Z.  (F10.0)                     *
C*                    ELEVATION FROM WHICH PARALLEL LINES ARE TO BE       *
C*                    PLOTTED.                                            *
C*          DZZ     - ELEVATION INCREMENT DISTANCE AT WHICH NEXT PARALLEL *
C*                    LINES (TO ELEVATION) ARE TO BE PLOTTED.  (F10.0)    *
C*          NLINZ   - TOTAL NUMBER OF LINES PARALLEL TO ELEVATION TO BE   *
C*                    PLOTTED. (I2)                                       *
C*          XX      - OPTION TO PLOT LINES PARALLEL TO AND EITHER BEHOND  *
C*                    DEPARTURE OR LATITUDE VALUE.                        *
C*                    IF XX=X, LINES PARALLEL TO THE DEPARTURE ARE        *
C*                       PLOTTED.                                         *
C*                    IF XX=Y, LINES PARALLEL TO THE LATITUDE ARE         *
C*                       PLOTTED.                                         *
C*          XVALUE  - DEPARTURE OR LATITUDE VALUE FROM WHICH PARALLEL     *
C*                    LINES ARE TO BE PLOTTED.                            *
C*          DXX     - DEPARTURE OR LATITUDE INCREMENT DISTANCE AT WHICH   *
C*                    NEXT PARALLEL LINES ARE TO BE PLOTTED. (F10.0)      *
C*          NLINX   - TOTAL NUMBER OF LINES PARALLEL TO THE DEPARTURE OR  *
C*                    LATITUDE. (I2)                                      *
C*      CARD 7 - (IDDHF(J),IDDHT(J),J=1,N1517)                           *
C*               FORMAT READ IS (3(R7,3X,R7,3X))                          *
C*               THIS CARD IS REQUIRED WHEN IR15 IS NE 0.                 *
C*          IDDHF   - ARRAY OF THE FIRST MEG DRILL HOLE NUMBERS OF A      *
C*                    SEQUENCE TO BE INCLUDED IF IR15 GE 1 OR EXCLUDED    *
C*                    IF IR15 LE -1                                       *
C*          IDDHT   - ARRAY OF THE LAST MEG DRILL HOLE NUMBERS OF A       *
C*                    SEQUENCE TO BE INCLUDED OR EXCLUDED FROM            *
C*                    PROCESSING.                                         *
C*                    EXAMPLE:                                            *
C*                    ZZZ0025   ZZZ0030  HOLE NUMBERS 25 TO 30 ARE        *
C*                                       EXAMINED INCLUSIVELY.            *
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C*                  ZZZ0040            HOLE NUMBER 40 IS EXAMINED.      *
C*                  A MAXIMUM OF 100 GROUPS OF DRILL HOLES CAN BE       *
C*                  SPECIFIED. THE HOLE NUMBERS SHOULD BE IN ASCENDING  *
C*                  ORDER. A MAXIMUM OF 3 GROUPS OF HOLES ARE TO BE     *
C*                  SPECIFIED PER CARD.                                 *
C*                  (REFER TO VARIABLE IR15).                           *
C*     CARD 8 - (XTI(J),YTI(J),ZTI(J),J=1,NO)                           *
C*              FORMAT READ IS (6F10.0)                                 *
C*              THIS CARD IS NOT REQUIRED WHEN NO=0.                    *
C*         XTI    - ARRAY REPRESENTING DEPARTURES OF NEW TRANSLATION    *
C*                  COORDINATES.                                        *
C*         YTI    - ARRAY OF LATITUDE REPRESENTING THE NEW TRANSLATION  *
C*                  COORDINATES.                                        *
C*         ZTI    - ARRAY OF ELEVATION REPRESENTING THE NEW             *
C*                  TRANSLATION COORDINATES.                            *
C*                  2 SETS OF COORDINATE VALUES PER CARD.               *
C*                  A MAXIMUM OF 9 NEW TRANSLATION POINTS CAN BE GIVEN.*
C*     CARD 9 - (IX5I(J),DXLI(J),IZ5I(J),DZLI(J),ZZI(J),ZVALUI(J),      *
C*               DZZI(J),NLINZI(J),XXI(J),XVALUI(J),DXXI(J),NLINX(J),   *
C*               J=1,NO)                                                *
C*               FORMAT READ IS (2(I5,F10.0),2(R1,2F10.0,I2))           *
C*                  THIS CARD IS NOT REQUIRED IF NO=0 AND IR14=0.       *
C*               VARIABLE NO MUST BE .LE. 9.                            *
C*               THIS CARD IS UTILIZED TO PLOT SPECIAL LINES ON THE     *
C*               GRID WHEN OPTIONS NO AND IR14 ARE SELECTED.            *
C*               THE FORMAT AND VARIABLES DESCRIPTION ARE THE SAME AS   *
C*                  CARD 6.                                             *
C*                  (REFER TO CARD 7 AND VARIABLES NO AND IR14).        *
C*     CARD 10 - (XPL(K,I),YPL(K,I),ZPL(K,I),I=1,4),K=1,IR25)           *
C*                FORMAT READ IS (3F10.0)                               *
C*               DO NOT SPECIFY THIS CARD WHEN IR25=0.                  *
C*                4 CARDS ARE SPECIFIED BY ZONE,EACH CARD REPRESENTS    *
C*                THE COORDINATES XPL YPL ZPL OF ZONE CORNER            *
C*                  (1 - CARD 1), (2 - CARD 2), (3 - CARD 3),           *
C*                  (4 - CARD 4)                                        *
C*              SEE DIAGRAM BELOW.                                      *
C*         XPL( ) - DEPARTURE COORDINATE (X)                            *
C*         YPL( ) - LATITUDE COORDINATE (Y)                             *
C*         ZPL( ) - ELEVATION COORDINATE (Z)                            *
C*                                                                      *
C*                      IIIIIIIIIIX (XPL,YPL,ZPL(K,3))                  *
C*                     I          II                                     *
C*                    I          I I                                     *
C*                   I          I  I                                     *
C*(XPL,YPL,ZPL(K,2))XIIIIIIIIII   I                                     *
C*                  I          I   X(XPL,YPL,ZPL(K,4))                  *
C*                  I          I  I                                     *
C*                  I          I I                                      *
C*                  I          II                                       *
C*(XPL,YPL,ZPL(K,1))XIIIIIIIIII                                         *
C*                                                                      *
C*                  K REPRESENTS THE ZONE NUMBER                        *
C*                  1 - 2 - 3 - 4 REPRESENT THE CORNER COORDINATES OF   *
C*                  THE ZONE TO BE ELEMINATED.                          *
C*     CARD 11 - IR13,IP1,IFMT1                                         *
C*               FORMAT READ IS (2I5,7R10)                              *
C*         IR13   - THIS OPTION IS USED TO PLOT A MAXIMUM OF 10         *
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C*                  VARIABLES BESIDE THE DRILL-HOLE COLLAR.                *
C*                  IR13 REPRESENTS THE NUMBER OF VARIABLES.               *
C*                  THE VARIABLES ARE DETERMINED IN CARD 12 AND ARE        *
C*                  IUDN,ICDN,ISIOD,XCOL,YCOL,ZCOL,(VAR(I),I=1,IR13)       *
C*          IP1     - OPTION FOR DETERMINING WHICH FILE (DISK OR CARDS)    *
C*                  TO USE FOR PLOTTING (USED WITH OPTION IR13)            *
C*                  IF IP1=0 NO VARIABLES WILL BE PLOTTED (IR13=0)         *
C*                  IF IP1.LT.0 DATA ARE ON INPUT CARDS AND ABS(IP1)       *
C*                     REPRESENTS THE NUMBER OF INPUT CARDS TO BE READ     *
C*                     ACCORDING TO FORMAT IFMT1.                          *
C*                  IF IP1.GT.0 DATA IS STORED ON DISK FILE PFNI3.         *
C*                     THE DISK FILE WILL BE READ TO AN EOF ACCORDING      *
C*                     TO FORMAT IFMT1.                                    *
C*                  EXAMPLE IF IP1=-34  34 CARDS WILL BE READ ON INPUT     *
C*                          IF IP1=+1 DATA IS READ FROM PFNI3 UNTIL        *
C*                                    AN EOF.                              *
C*          IFMT1   - IS THE FORMAT OF THE DATA GIVEN BY CARD 12 WHEN IP1  *
C*                  IS NEGATIVE OR THE FORMAT OF THE DATA STORED ON        *
C*                  FILE PFNI3 WHEN IP1 IS POSITIVE. THE VARIABLES TO      *
C*                  BE READ ON THE FILE OR DATA CARDS IS SPECIFIED IN      *
C*                  CARD 13                                                *
C*      CARD 12 - (IUDN,ICND,ISIOD,XCOL,YCOL,ZCOL,(VAR(I),I=1,IR13))       *
C*                IUDN - R7 EXAMPLE AAA0015                                *
C*                ICDN - R7 RECOMMENDED FORMAT                             *
C*                ISIOD - R6 RECOMMENDED FORMAT                            *
C*                   FORMAT READ IS SPECIFIED ON CARD 11.                  *
C*                   INPUT CARDS (12) ARE READ ONLY IF IP1.LT.0            *
C*                   IF IP1=-34, THERE SHOULD BE 34 CARD 12.               *
C*      CARD 13 - IP2,IFMT2                                                *
C*                FORMAT IS (I5,7R10)                                      *
C*          IP2     - OPTION TO PLOT POLYGONS AND SHAFTS.                  *
C*                  IF IP2=0 NO PLOTTING IS DONE.                          *
C*                  IF IP2.LT .0 DATA ARE ON INPUT CARDS AND ABS(IP2)      *
C*                     REPRESENTS THE NUMBER OF INPUT CARDS TO BE READ     *
C*                     ACCORDING TO FORMAT IFMT2.                          *
C*                  IF IP2.GT.0 DATA IS STORED ON DISK FILE PFNI4.         *
C*                     THE DISK FILE WILL BE READ TO AN EOF ACCORDING      *
C*                     TO FORMAT IFMT2.                                    *
C*          IFMT2   - FORMAT OF VARIABLES AS DESCRIBED IN CARD 14          *
C*      CARD 14 - (ICOM,X,Y,IEND,INEWP)                                    *
C*                FORMAT IS DEFINED BY IFMT2.                              *
C*                IEND IS USED TO REPRESENT THE END OF A POLYGON.          *
C*                (THE END OF A POLYGON IS INDICATED BY SPECIFYING         *
C*                VARIABLE IEND GT 0).                                     *
C*                THE NEXT DATA POINT (ICOM,X,Y,IEND) REPRESENT THE        *
C*                BEGINNING OF NEW POLYGON. A NEW POLYGON OF ONE POINT     *
C*                IS REPRESENTED BY A SPECIAL SYMBOL. (THIS CAN BE USED    *
C*                TO PLOT THE LOCATION OF A SHAFT ON A PLAN.).             *
C*                THE DATA CAN BE STORED ON CARDS OR DISK FILE PFNI4       *
C*                ICOM    - COMMENT OF MAXIMUM 10 CHARACTERS               *
C*                X       - DEPARTURE COORDINATE OF POLYGON                *
C*                Y       - LATITUDE COORDINATE OF POLYGON                 *
C*                IEND    - INDICATES THE END OF A POLYGON                 *
C*                          IF IEND = 0 OR BLANK SAME POLYGON              *
C*                          IEND=1 END OF ONE POLYGON OR USED TO PLOT      *
C*                          A SHAFT.                                       *
C*                INEWP   - PRODUCES A LINE WITH A THICK PEN NIB.          *
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C*                          INEWP=0 OR BLANK NO PEN CHANGE                *
C*                          INEWP=1 NEW PEN USED RESULTING IN A THICKER   *
C*                                  LINE PLOTTED.                         *
C*                                  WHEN THIS OPTION IS SELECTED A LARGER*
C*                                  PEN SIZE SHOULD BE SPECIFIED ON THE   *
C*                                  BEGIN CARD.                           *
C*                X AND Y SHOULD BE CODED CLOCKWISE STARTING FROM ANY     *
C*                POINT. TO CLOSE A POLYGON THE LAST POINT SHOULD BE      *
C*                EQUAL TO THE FIRST POINT.                               *
C*                ALL POLYGON POINTS MUST BE WITHIN THE PLOT LIMITS AS    *
C*                DEFINED BY XT,YT,ZT AND DX,DY,DZ (CARD 5).              *
C*                   INPUT CARDS (14) ARE READ ONLY IF IP2.LT.0)          *
C*                                                                        *
C*                                                                        *
C*************************************************************************
C*
C*
C*************************************************************************
C*                                                                        *
C******FILES USED                                                         *
C*                                                                        *
C*      TAPE1  : INPUT DATA CARDS                                         *
C*      TAPE2  : OUTPUT LISTING                                           *
C*               SECTION 1 -OPTION APPLIED ARE PRINTED                    *
C*               SECTION 2 -LIST OF DRILL HOLES ON FILE IS PRINTED        *
C*      TAPE3  : PERMANENT FILE INPUT (PFNI) OF THE OUTPUT FILE CREATED   *
C*               BY PROGRAM MEG1000 OR MEG1600 (UNFORMATED FILE)          *
C*      TAPE4  : PERMANENT FILE INPUT (PFNI2) OF THE OUTPUT FILE CREATED*
C*               BY PROGRAM MEG0100. (FORMATED FILE)                      *
C*      TAPE5  : PERMANENT FILE INPUT (PFNI3) USER CREATED FILE USED TO   *
C*               PLOT VARIABLES BESIDE THE DDH COLLAR.                    *
C*      TAPE7  : PERMANENT FILE INPUT (PFNI4) USER CREATED FILE USED TO   *
C*               PLOT DEPOSIT LIMITS AND DEPOSIT SHAFTS.                  *
C*     TAPE30    : PERMANENT FILE OUTPUT (PFNO) CALCOMP PLOT COMMANDS.    *
C*                                                                        *
C*************************************************************************
C*
C*
C*************************************************************************
C*                                                                        *
C******DECLARATION OF VARIABLES                                           *
C*                                                                        *
C*************************************************************************
C*
C*
      REAL XTI(20),YTI(20),ZTI(20),X(4),Y(4),Z(4),DZLI(20),CE(3),
     -     DXLI(20),TM(9),TMS(9),TGRAD(7),TGROS(7),R7(3),R7M(3),
     -     R13(3)
      INTEGER IX5I(20),IZ5I(20),IDDHF(100),IDDHT(100),ITU(3),
     -        IDDHP(100),ICOMNT(7),XX,ZZ,ICM(7),IAM(7),ITIT(4),METS(7),
     -        ENDF3,ENDF4,IR11(3),IR21(3)
      INTEGER ZZI(20),NLINZI(20),XXI(20),NLINXI(20)
      REAL ZVALUI(20),DZZI(20),XVALUI(20),DXXI(20)
      REAL XPL(10,50),YPL(10,50),ZPL(10,50)
C*
C******COMMON AREAS
C*
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

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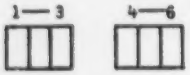
CARD NO. 1

IBR IMETR FORMAT(2I3)

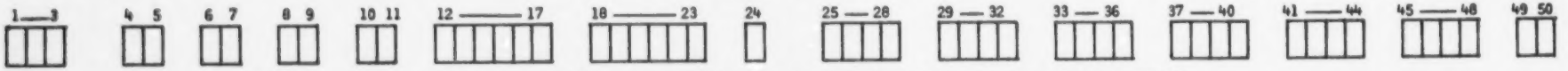


CARD NO. 2

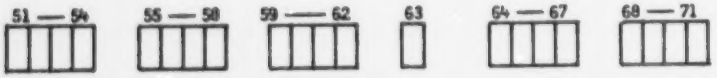
(ITIT(I),I=1,3) FORMAT(3A10)

CARD NO. 3

ISERIE IR1 IR3 IR4 IR5 R6X R6Z ITHICK IR25 IR8 IR9 R10 IR23 IR12 ICS



IR14 IR15 IR16 IR0 IR18 IR20 FORMAT(R3,4I2,2F6.0,R1,6I4,I2,3I4,R1,2I4)



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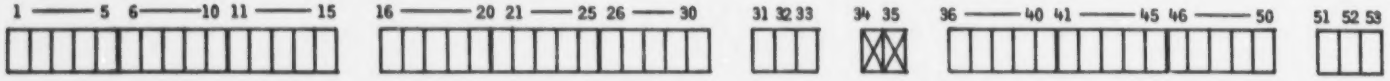
CARD NO. 4

(R7(I),I=1,3) (R7M(I),I-1,3) (IR11(I),I=1,3) (R13(I),I=1,3) (IR21(I),I=1,3)



FORMAT(6F5.0,3I1,2X,3F5.0,3I1)

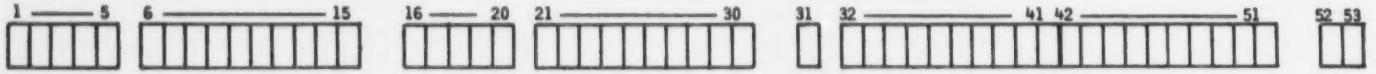
CARD NO. 5

XT YT ZT DX DY DZ ALFA BETA GAMMA NO

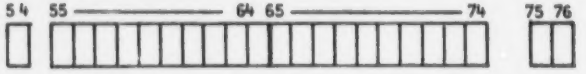
FORMAT(2(I5F,F10.0),2(R1,2F10.0,I2))

CARD NO. 6

IX5 DXL IZ5 DZL ZZ ZVALUE DZZ NLINZ



XX XVALUE DXX NLINX



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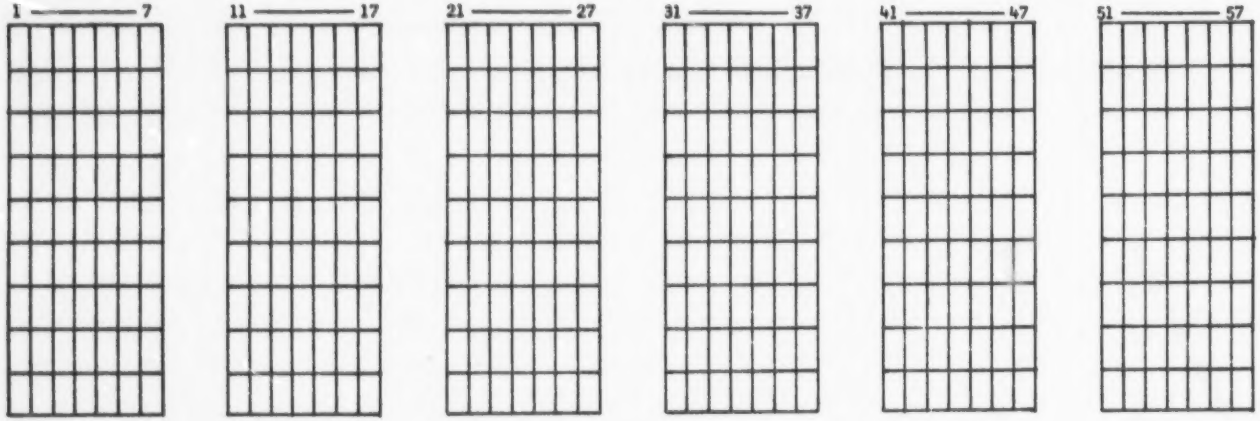
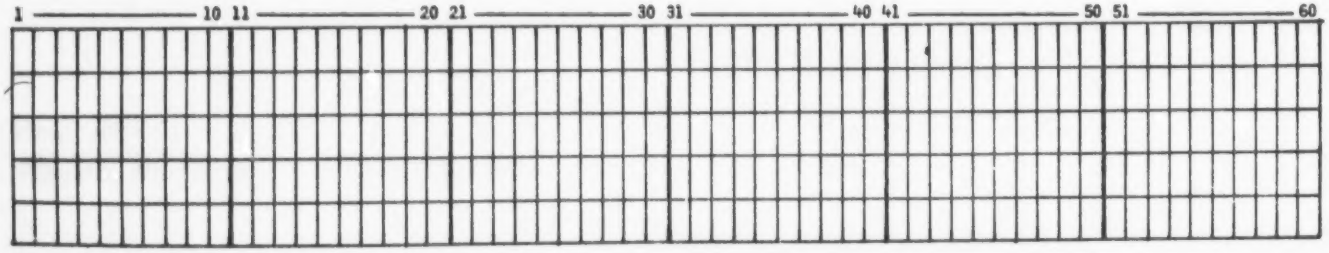
CARD NO. 7

(IDDHF(J) IDDHT(J),J=1,N1517) N1517=IABS(IR15)≤100, FORMAT(3(R7,3X,R7,3X))



CARD NO. 8

(XTI(J),YTI(J),ZTI(J),J=1,NO) NO≤9 FORMAT(6F10.0)



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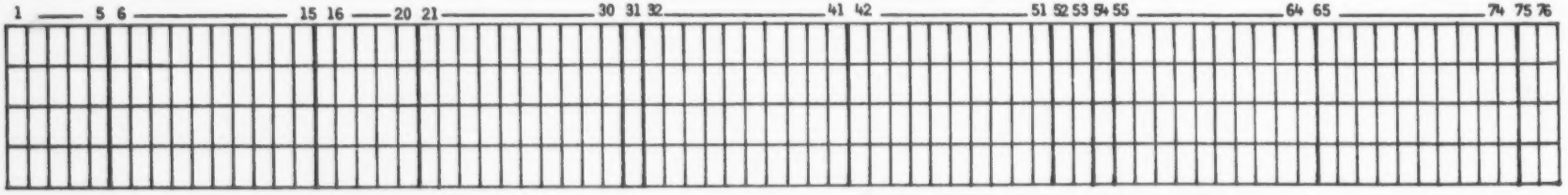
CARD NO. 9

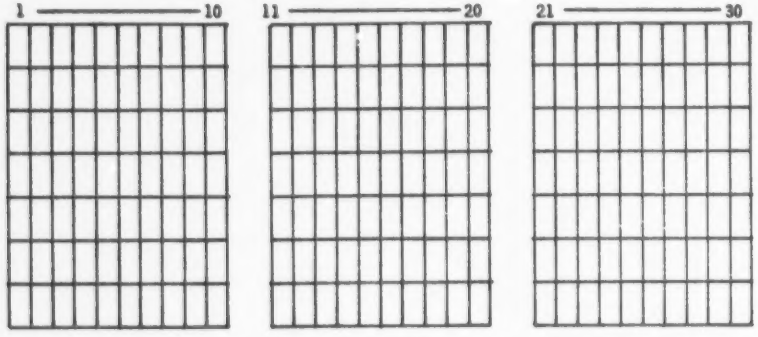
(IX5I(J),DXLI(J), IZ5I(J),DZLI(J), ZZI(J),ZVALUE(J),DZZI(J),NLINZI(J),XXI(J),XVALUI(J),DXXI(J),NLINX(J),J=1,NO)



FORMAT(2(I5,F10.0),2(R1,2F10.0,I2))

CARD NO. 10

XPL(K,I), YPL(K,I), ZPL(K,I),I=1,4),K=1,IR25) FORMAT(3F10.0)



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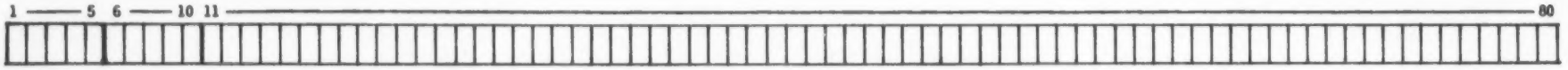
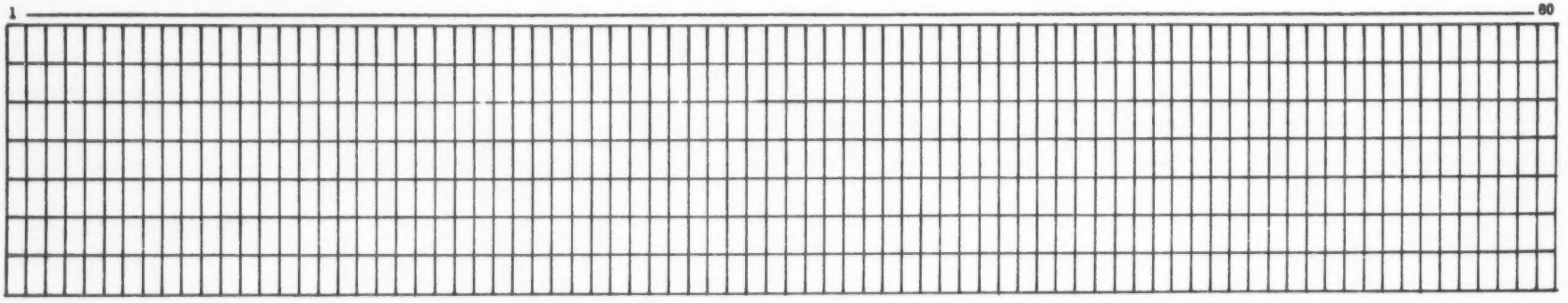
CARD NO. 11
IR13 IP1 IFMT1 FORMAT(2I5,7R10)



CARD NO. 12
IUDN,ICND,ISIOD,XCOL,YCOL,ZCOL,(VAR(I),I=1,IR13)



THE FORMAT IS SPECIFIED BY IFMT1 IN CARD NO. 11.

CARD NO. 13
IP2 IFMT2 FORMAT(I5,7R10)

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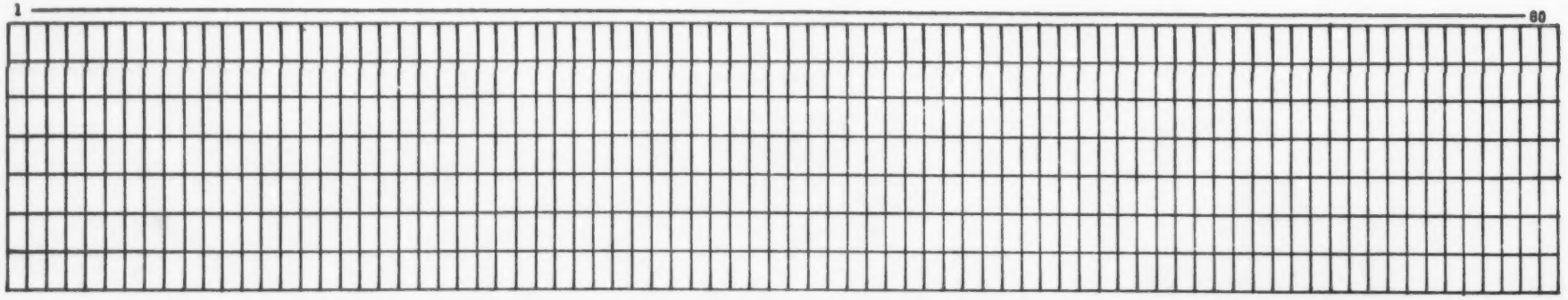
CARD NO. 14
(ICOM,X,Y,IEND,INEWP)



THE FORMAT IS SPECIFIED BY IFMT2 IN CARD NO. 13.

EXECUTION

```
H3000,CM120000,T400,IO1000,P2
ACCOUNT,XXXXX.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=XXX,MR=1.
BEGIN,CADD,PROCD,PROGRAMIN=
PFNI=                    ,(PERMANENT FILE NAME
PFNI2=                   ,(PERMANENT FILE NAME
PFNI3=                   ,(PERMANENT FILE NAME
PFNI4                    ,(PERMANENT FILE NAME
PFNO=                    .(PERMANENT FILE NAME OUTPUT
```

REFER TO PROCEDURE FOR EXECUTION

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

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CARD NO. 1

IBR IMETR FORMAT(2I3)

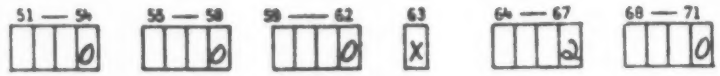
CARD NO. 2

(ITIT(I),I=1,3) FORMAT(3A10)

CARD NO. 3

ISERIE IR1 IR3 IR4 IR5 R6X R6Z ITHICK IR25 IR8 IR9 R10 IR23 IR12 ICS

IR14 IR15 IR16 IR0 IR18 IR20 FORMAT(R3,4I2,2F6.0,R1,6I4,I2,3I4,R1,2I4)



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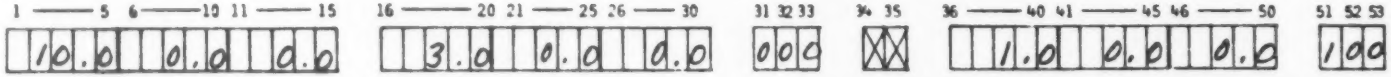
CARD NO. 4

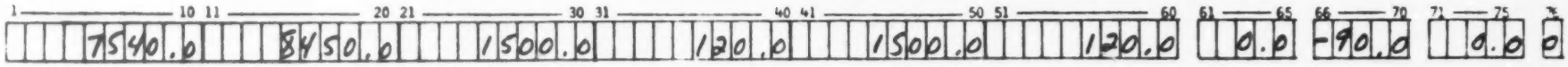
(R7(I),I=1,3) (R7M(I),I-1,3) (IR11(I),I=1,3) (R13(I),I=1,3) (IR21(I),I=1,3)



FORMAT(6F5.0,3I1,2X,3F5.0,3I1)

CARD NO. 5

XT YT ZT DX DY DZ ALFA BETA GAMMA NO

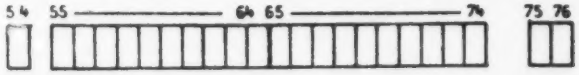


FORMAT(2(I5F,F10.0),2(R1,2F10.0,I2))

CARD NO. 6 (NOT USED)

IX5 DXL IZ5 DZL ZZ ZVALUE DZZ NLINZ

XX XVALUE DXX NLINX



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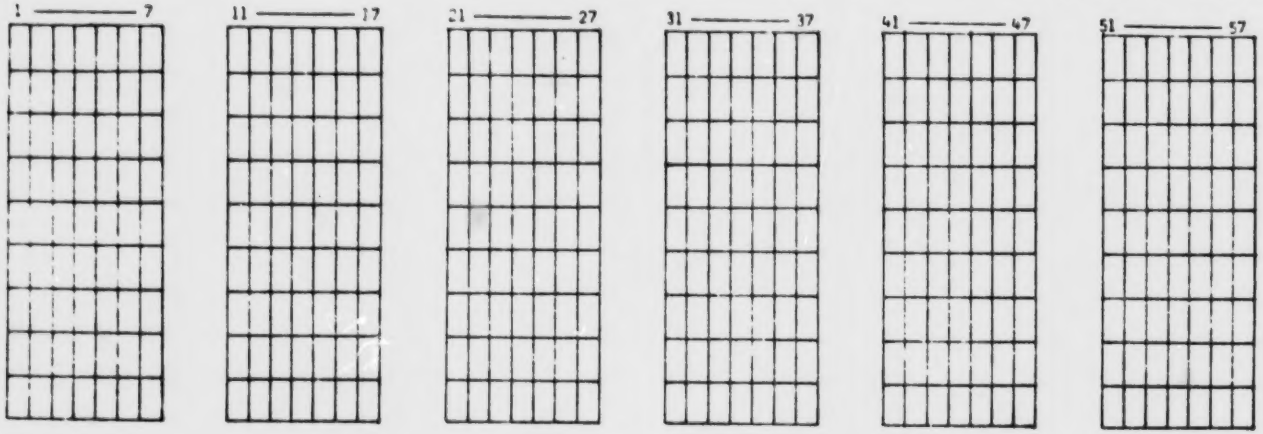
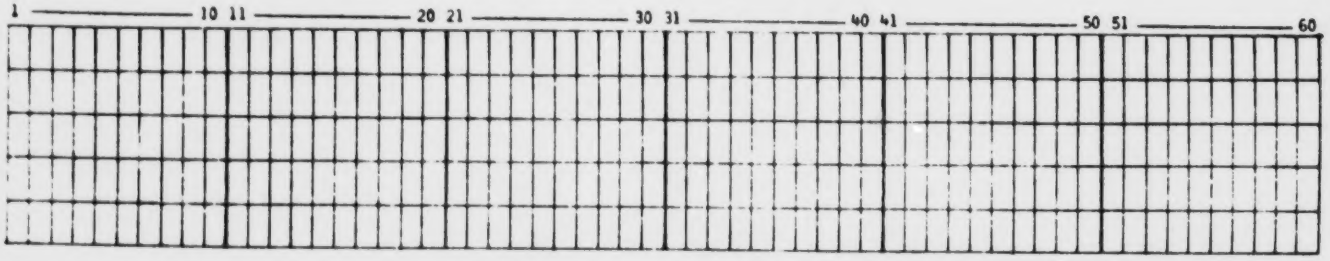
CARD NO. 7 (NOT USED)

(IDDHF(J) IDDHT(J),J=1,N1517) N1517=IABS(IR15)≤100. FORMAT(3(R7,3X,R7,3X))



CARD NO. 8 (NOT USED)

(XTI(J),YTI(J),ZTI(J),J=1,NO) NO≤9 FORMAT(6F10.0)



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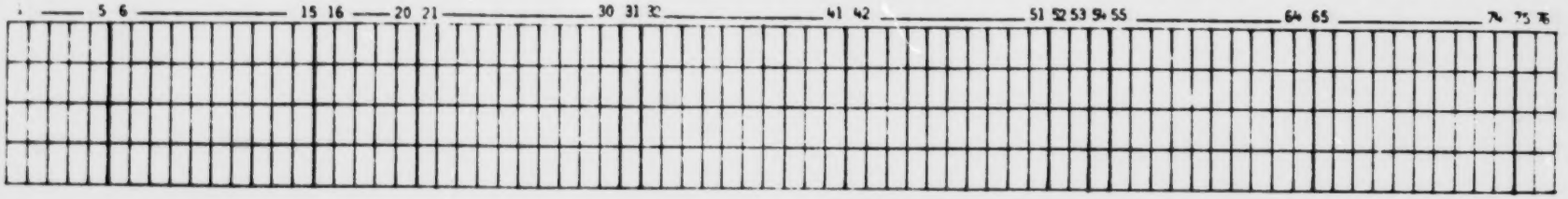
CARD NO. 9 (NOT USED)

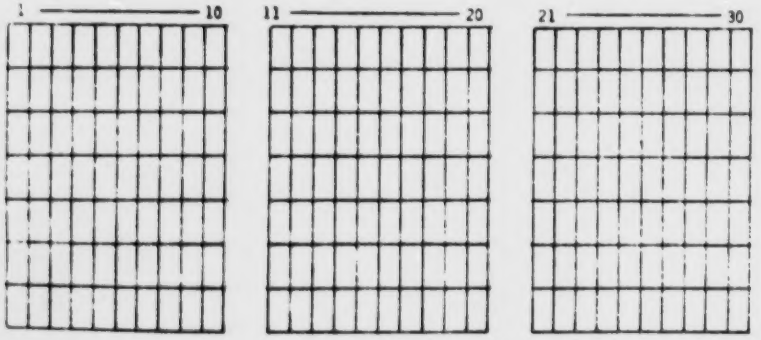
(IX5I(J),DXLI(J), IZ5I(J),DZLI(J), ZZI(J),ZVALUE(J),DZZI(J),NLINZI(J),XXI(J),XVALUI(J),DXXI(J),NLINX(J),J=1,NO)



FORMAT(2(I5,F10.0),2(R1,2F10.0,I2))

CARD NO. 10 (NOT USED)

XPL(K,I), YPL(K,I), ZPL(K,I),I=1,4),K=1,IR25) FORMAT(3F10.0)



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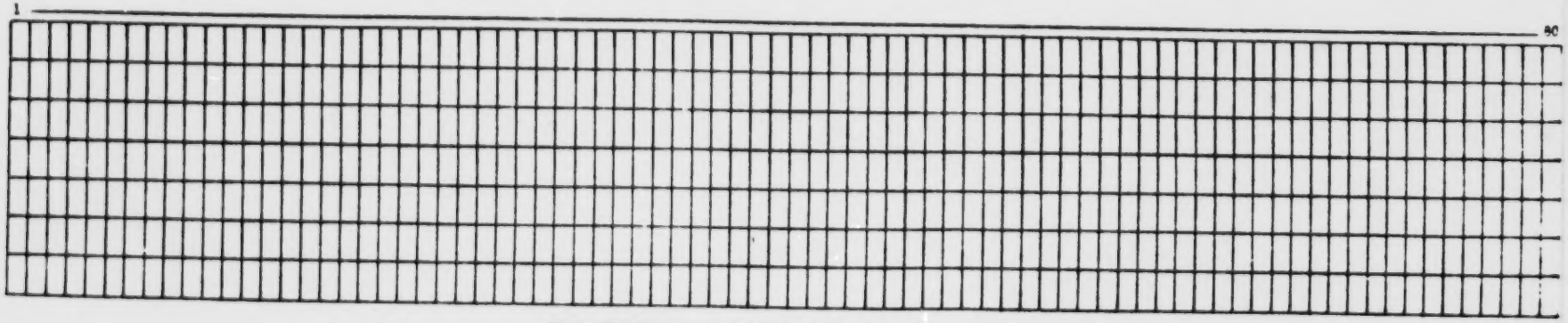
CARD NO. 11
IR13 IP1 IFMT1 FORMAT(2I5,7R10)

CARD NO. 12 (NOT USED)
IUDN,ICND,ISIOD,XCOL,YCOL,ZCOL,(VAR(I),I=1,IR13)



THE FORMAT IS SPECIFIED BY IFMT1 IN CARD NO. 11.

CARD NO. 13
IP2 IFMT2 FORMAT(I5,7R10)

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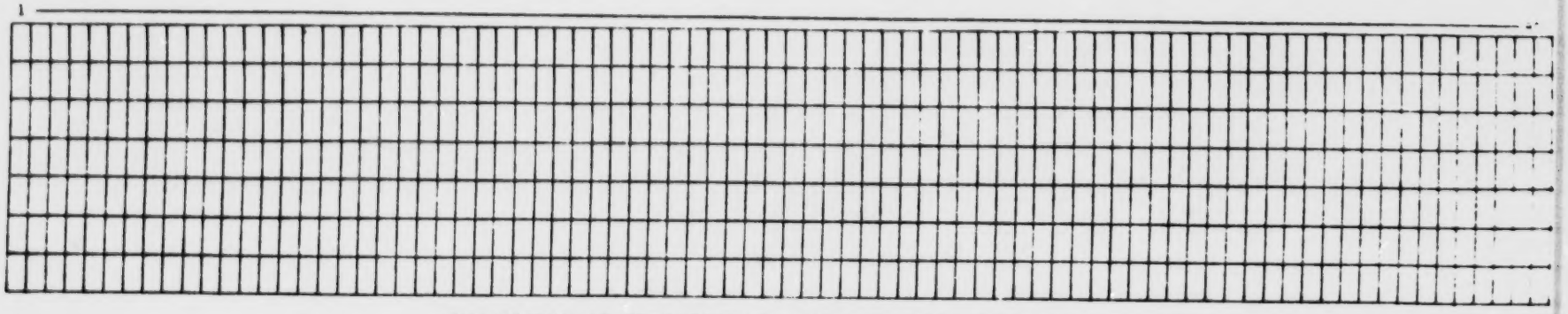
CARD NO. 14 (NOT USED)
(ICOM,X,Y,IEND,INEWP)



THE FORMAT IS SPECIFIED BY IFMT2 IN CARD NO. 13.

EXECUTION

```
H3000,CM120000,T400,I01000,P2
ACCOUNT,XXXXX.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=XXX,MR=1.
BEGIN,CADD,PROCD,PROGRAMIN=
PFNI= MEG1600Z2X  ,(PERMANENT FILE NAME
PFNI2=            ,(PERMANENT FILE NAME
PFNI3=            ,(PERMANENT FILE NAME
PFNI4             ,(PERMANENT FILE NAME
PFNO=             .(PERMANENT FILE NAME OUTPUT
```

REFER TO PROCEDURE FOR EXECUTION

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	IBN=	480	BAUD RATE:
	IMETR=	0	IMPERIAL TO METRIC CONVERTION OF DRILL HOLE COORDINATES IMETR=0: DEFAULT NO CONVERTION DONE IMETR>0: CONVERTION TO METRIC (METERS)
2	ITIT=	MEG3000 ZZX MAY, 1982	TITLE PLOTTED BY THE CALCOMP IN THE LEGEND BOX:
3	ISERIE=	ZZX	MEG SERIAL CODE OF INPUT DATA FILE(S):
	IR1=	2	CODE FOR THE TYPE OF INPUT FILE(S): IR1=1: MEG1000 OR MEG1600 OUTPUT FILE IS READ: IR1=2: MEG1000 (OR MEG1600) AND MEG0100 OUTPUT FILES ARE READ
	IR3=	0	OPTIONS OF GRID OUTPUT DRAWN ONTO THE PLOT: IR3=0: POSITIVE SIGNS PLOTTED AT THE PERIPHERY ONLY: IR3=1: POSITIVE SIGNS PLOTTED AT PERIPHERY AND INSIDE THE PLOT AREA: IR3=2: HORIZONTAL LINES DRAWN IN ADDITION TO OPTION 1 (IR3=1): IR3=3: VERTICAL LINES DRAWN IN ADDITION TO OPTION 1: IR3=4: HORIZONTAL AND VERTICAL LINES DRAWN IN ADDITION TO OPTION 0:
	IR4=	4	NUMBER OF GRID DIVISIONS ON THE HORIZONTAL AXIS OF THE PLOT:
	IR5=	4	NUMBER OF GRID DIVISIONS ON THE VERTICAL AXIS OF THE PLOT:
	R6X=	1.0	LENGTH (INCHES) OF ONE GRID DIVISION ON THE HORIZONTAL AXIS OF THE PLOT:
	R6Z=	1.0	LENGTH (INCHES) OF ONE GRID DIVISIONS ON THE VERTICAL AXIS OF THE PLOT:
	ITHICK=	4	PROJECTED THICKNESS OF ECONOMICAL INTERSECTIONS OF MEG0100
	IR25=	0	NUMBER OF ZONES FROM WHICH INFORMATION IS NOT PLOTTED
	IR8=	1	PROFILE CODE: IR8=0: NO PROFILE PLOTTED: IR8=1: PROFILE PLOTTED AT A GIVEN ANGLE (R10): IR8=2: PROFILE PLOTTED AT 90 DEGREES TO THE DRILL HOLE SEGMENT:
	IR9=	0	OPTION FOR WRITING ACTUAL VALUES OF PROFILES WHEN THE VALUE EXCEEDS THE MAXIMUM ACCEPTABLE LIMIT FOR A PROFILE (R7): IR9=0: NO VALUES ARE WRITTEN WHEN VARIABLE EXCEEDS R7: IR9.GE.1: ACTUAL VALUE WRITTEN WITH IR9 DIGITS AFTER DECIMAL POINT:
	R10=	0.0	CARTESIAN ANGLE (DEGREES) AT WHICH PROFILES AND OTHER INFORMATION WILL BE PLOTTED:
	IR23=	0	CODE TO PLOT (IN/OUT) SIGNS WHENEVER A DRILL HOLE ENTERS AND/OR LEAVES THE BLOCK: IR23=0: IN/OUT SIGNS ARE PLOTTED: IR23=1: IN/OUT SIGNS ARE NOT PLOTTED:
	IR12=	1	OPTION TO PLOT DRILL HOLE COLLAR SYMBOL, NAME AND SEGMENTS: IR12=0: MEG SERIAL AND NUMBER WRITTEN PARALLEL TO FIRST

IR12=2: COMPANY DRILL HOLE NUMBER PLOTTED;
IR12=3: MEG HOLE NUMBER AND COMPANY HOLE NAME PLOTTED;
IR12=4: SPECIAL IDENTIFICATION PLOTTED;
IR12=5: 4 FIRST CHARACTERS OF MEG SPECIAL IDENT. PLOTTED;
IR12=6: MEG HOLE NUMBER AND 4 FIRST CHAR. OF SPECIAL IDENT. PLOTTED;
IR12=8: COLLAR,MEG HOLE # PLOTTED. SEGMENTS,PROFILES,... NOT PLOTTED;
IR12=9: NO DDH NUMBER IS PLOTTED

ICS= 11

CODE FOR SPECIAL SYMBOL TO REPRESENT THE DRILL HOLE COLLAR;
ICS=0: SQUARE;
ICS=1: HEXAGON;
ICS=2: TRIANGLE;
ICS=5: DIAMOND;
ICS=11: ASTERIX;

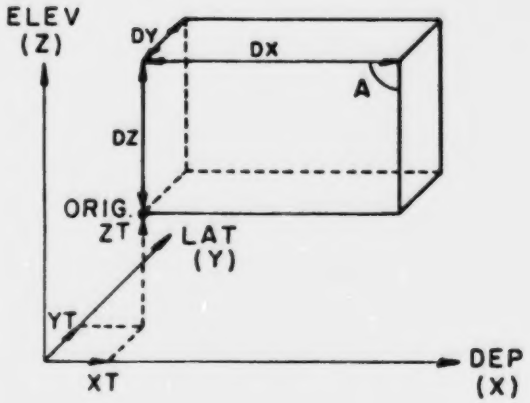
```
      IR14=          0      OPTION TO PLOT GRID LINES OTHER THAN THE ONES DEFINED IN IR3:
                              IR14=0: NO SUPPLEMENTARY LINES ARE PLOTTED:
                              IR14.GE.1: SUPPLEMENTARY LINES ARE PLOTTED IN THE GRID:

      IR15=          0      NUMBER OF GROUPS OF DRILL HOLES NOT TO PLOT OR TO PLOT
                            IDDHF(J) AND IDDHT(J)):
                              IR15=0: ALL DRILL HOLES INTERSECTING THE VOLUME ARE PLOTTED:
                              IR15.GE.1: THE SPECIFIED GROUPS OF DRILL HOLES WILL BEPLOTTED:
                              IR15.LE.-1: THE SPECIFIED GROUPS OF DRILL HOLES WILL NOT BE PLOTTED:

      IR16=          0      OPTION TO COMPUTE NEW TRANSLATION POINTS (XT,YT,ZT):
                              IR16=0: NO EXTRA PLOTS PRODUCED:
                              IR16.GT.0: NUMBER OF NEW TRANSLATION POINT(S) TO BE COMPUTED:

      IRO=                   DIRECTION OF THE TRANSLATION:
                              IRO=X: TRANSLATION IS ALONG THE X POSITIVE AXIS:
                              IRO=Y:      "      "   "   "  Y    "      "  :
                              IRO=Z:      "      "   "   "  Z    "      "  :

      IR18=          2      OPTION TO PLOT ROCK TYPE, ZONE CODE OR BOTH:
                              IR18=0: ROCK TYPE AND ZONE CODE ARE NOT PLOTTED:
                              IR18=1: ROCK TYPE IS PLOTTED:
                              IR18=2: ZONE CODE IS PLOTTED:
                              IR18=3: BOTH ROCK TYPE AND ZONE CODE ARE PLOTTED:

      IR20=          0      OPTION TO DISPLACE COLLAR AND ALL SEGMENTS OF DRILL HOLE BY CONSTANT VALUE:
                              IR20=0: DEPARTURE, LATITUDE, ELEVATION AT COLLAR NOT MODIFIED:
                              IR20=1: COLLAR ELEVATION IS SET TO 0.0 AND ALL SEGMENTS ARE ADJUSTED
                                      TO NEW ELEVATION:
                              IR20=2: DEPARTURE, LATITUDE OR ELEVATION DIMINISHED BY CONSTANT VALUE:

4     R7(1)=        10.0
      R7(2)=         0.0
      R7(3)=         0.0     MAXIMUM VALUES USED FOR PLOTTING THE MAXIMUM HEIGHT OF PROFILES:

      R7M(1)=        3.0
      R7M(2)=        0.0
      R7M(3)=        0.0     MINIMUM PROFILE VALUES BELOW WHICH PROFILES ARE NOT PLOTTED:

      IR11(1)=       0
      IR11(2)=       0
      IR11(3)=       0       PROFILE SCALE:
                              IR11=0: PROFILE SCALE IS LINEAR:
                              IR11=1: PROFILE SCALE IS LOG BASE 10:

      R13(1)=        1.0
      R13(2)=        0.0
      R13(3)=        0.0     MAXIMUM HEIGHT (INCHES) FOR A PROFILE:

      IR21(1)=       1
      IR21(2)=       0
      IR21(3)=       0       TYPE OF VARIABLES TO BE PLOTTED AS A PROFILE:
                              IR21=0: NO PROFILE PRODUCED:
                              IR21=1: U308 LB/TON GRADE VALUE PROFILE:
                              IR21=2: TH02 LB/TON GRADE VALUE PROFILE:
                              IR21=3: METAL 1 GRADE VALUE PROFILE:
                              IR21=4:   "   2   "     "     "   :
                              IR21=5:   "   3   "     "     "   :
                              IR21=6:   "   4   "     "     "   :
                              IR21=7:   "   5   "     "     "   :
                              IR21=8: HOLE CORE RECOVERY:
```

			PROFILE IS REPRESENTED BY R/(I)*M/M(I)*IM11(I)*M13(I)*IM21(I)$
5	XI=	7540.0	DEPARTURE OF TRANSLATION POINT (FEET)$
	YI=	8450.0	LATITUDE OF TRANSLATION POINT (FEET)$
	ZI=	1500.0	ELEVATION OF TRANSLATION POINT (FEET)$
	DA=	120.0	LENGTH ALONG THE DEPARTURE (FEET)$
	DY=	1500.0	LENGTH ALONG THE LATITUDE (FEET)$
	DZ=	120.0	LENGTH ALONG THE ELEVATION (FEET)$
	ALFA=	0.0	ROTATION ANGLE (DEGREES) ABOUT Z AXIS$
	BETA=	-90.0	" " " " X " $
	GAMMA=	0.0	" " " " Y " $
	NU=	0	NUMBER OF EXTRA PLOTS WITH SAME OPTIONS AT DIFFERENT TRANSLATION POINTS$
11	IM13=	0	OPTION USED TO PLOT VARIABLES BESIDE THE DDH COLLAR
	IP1=	0	OPTION USED FOR FILE SELECTION (DISKOR CARDS)
	IFMT1=		FORMAT USED TO READ DATA
13	IP2=	0	OPTION TO PLOT POLYGONS AND SHAFTS
	IFMT2=		FORMAT USED TO READ POLYGON COORDINATES

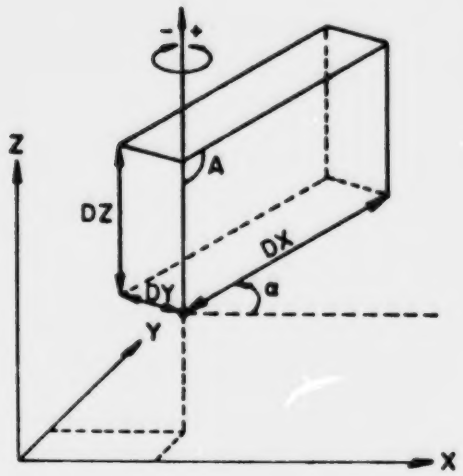
SECTION 2 - LIST OF DRILL HOLES ON FILE

MEG DDH #	CU DDH #	SP-ID # SEG	DEPARTURE	LATITUDE	ELEVATION	SEG IN BLOCK	SEG TO SEG IN BLOCK		IN BLOCK	OUT OF BLOCK COMMENT
ZZX0009	X15	49	19720.0	2590.0	1152.0	0	0	0		----------
ZZX0038	77032	59	7600.0	8540.0	1210.5	29	31	59	**********	

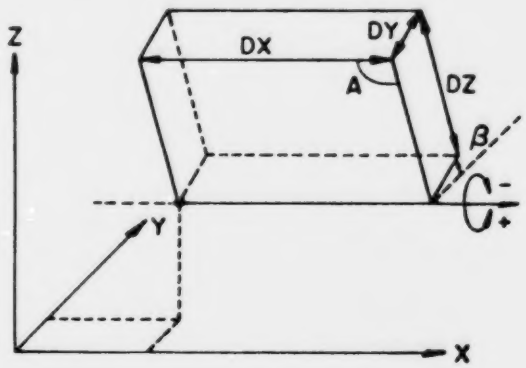
TRANSLATION



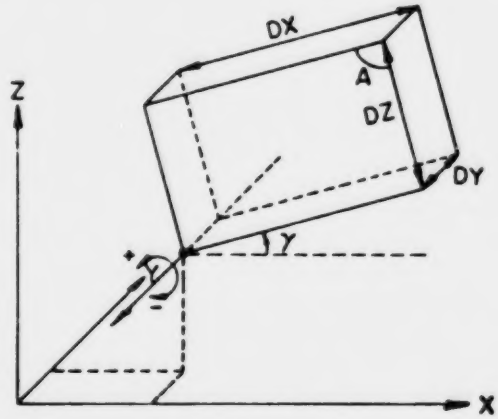
ROTATION α



ROTATION β



ROTATION γ



A Block in Space is Defined by an Origin (XT, YT, ZT), It's Sides (DX, DY, DZ) and Three Angles of Rotation (α, β, γ). The Information Inside the Block is Projected on Plane (A) by the Computer Program. Positive Angles are Counter Clockwise.

8570 N
8550 N
8530 N
8510 N
8490 N
8470 N
8450 N
7660 E
7640 E
7620 E
7600 E
7580 E
7560 E
7540 E
3.79/10.0
5.91/16.9
OUT
BC

REFERENCES

1. Sabourin, R.L., "Program MEG0100 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-101(TR), CANMET, Energy, Mines and Resources Canada; 1982.

2. Boyle, R., "Program MEG1000 User's Guide - CADD System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-96(TR), CANMET, Energy, Mines and Resources Canada; 1982.

3. Boyle, R., "Program MEG1600 User's Guide - CADD System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-99(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

ERP – MRL

82–104 TR

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CANMET

Canada Centre for Mineral and Energy Technology | Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2040 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for circulation and [illegible] reporting purposes. It does not represent final [illegible] the opinion of the [illegible] for Mineral and Energy Technology (CANMET)

Ce document est un rapport provisoire non-révisé et rédigé principalement pour [illegible] de documentation [illegible] représente nulle[illegible] définitive de [illegible] Centre canadien de [illegible]logie des minéraux et de l'énergie (CANMET)

22 pp

ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

DIVISION REPORT ERP/MRL 82-104(TR)

PROGRAM MEG2040 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2040 is to define equal length segments along drillholes. The segments are defined from the drillhole collar, from a preset elevation or from the top or bottom of a selected mineralized zone.

MEG2040 reads drillhole data from the output file of MEG100 or MEG1600. Equal length segments within the region of study are each identified by block indices which could be used to group all segments having the same block indices. MEG2040 will optionnally select two metals from those available on the input file and will either calculate the grade or the metal per unit of volume of each selected metal.

The results of MEG2040 can be used by MEG2050 and subsequently MEG2055 to compute local and global reserve estimates using moving averages or inverse distances weighing methods. It can also be used by MEG2300 to calculate the reserves using geostatistical methods.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

---

*Mining Geologist and Geostatistician, Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa.

GUIDE D'USAGER POUR LE PROGRAMME MEG2040
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2040 est de définir des segments d'égale longueur le long de forages. Les segments sont définis à partir du collier du forage, d'une élévation donnée ou du haut ou de la base d'une zone minéralisée.

MEG2040 lit les données de forages du fichier de sortie des programmes MEG1000 ou MEG1600. Les segments d'égale longueur à l'intérieur d'une région étudiée sont tous identifiés par des indices de blocs et tous les segments ayant les mêmes indices peuvent alors être regroupés. MEG2040 peut choisir optionnellement deux métaux parmi ceux disponibles sur le fichier d'entrée et peut calculer la teneur ou la quantité de métal par unité de volume.

Les résultats de MEG2040 peuvent être utilisés par MEG2050 et les résultats de celui-ci par MEG2055 pour calculer les réserves locales et globales utilisant les méthodes de moyennne mobile et de l'inverse des distances. Les résultats de MEG2040 peuvent aussi être utilisés par MEG2300 pour calculer les réserves en utilisant les méthodes géostatistiques.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

---

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CHAPTER 1.0
GENERAL DOCUMENTATION

73/74 OPT=1 FTN 4.8+528

```
      PROGRAM MEG2040(INPUT,OUTPUT,TAPE1=INPUT,TAPE2=OUTPUT,TAPE3,
     -TAPE4,TAPE5)
C*
C*
C*****************************************************************************
C*                                                                             *
C*                                                                             *
C******GENERAL DESCRIPTION                                                    *
C*                                                                             *
C*     PROGRAM MEG2040 DEFINES EQUAL LENGTH SEGMENTS ALONG DRILL-HOLES.        *
C*     THE SEGMENTS ARE DEFINED FROM THE DRILL-HOLE COLLAR, FROM A PRE-        *
C*     SET ELEVATION OR FROM THE TOP OR BOTTOM OF A SELECTED ZONE (SEE         *
C*     OPTION IZONE). PROGRAM MEG2040 READS DRILL-HOLE DATA FROM TAPE3         *
C*     (BINARY FILE) WHICH IS THE OUTPUT FILE OF PROGRAMS MEG1000 OR           *
C*     MEG1600.                                                                *
C*     INFORMATION ASSOCIATED WITH KNOWN UNEQUAL LENGTH SEGMENTS IS            *
C*     USED TO DEFINE NEW EQUAL LENGTH SEGMENTS (OF LENGTH SEG)                *
C*     ACCORDING TO OPTION SPECIFICATIONS. THE SEGMENTS USED BY THIS           *
C*     PROGRAM ARE THOSE SATISFYING A RANGE OF DIP AND AZIMUTH                 *
C*     ORIENTATION (IXYZ OPTION) OR THOSE FOUND WITHIN A VOLUME DEFINED        *
C*     BY A REFERENCE POINT (PRX1,PRY1, AND PRZ) AND ITS THREE                 *
C*     DIMENSIONS (NX*SX,NY*SY,NZ*SZ). TWO METALS (WITH CODES IT1,AND          *
C*     IT2) CAN BE CHOSEN FROM THE DATA FILE.                                  *
C*     THE VARIABLE TH3 USUALLY REPRESENTS A CONSTANT DENSITY, WITH            *
C*     TH1 AND TH2 REPRESENTING GRADE VALUES FOR THE METALS CHOSEN.            *
C*     HOWEVER, IF THE DENSITY IS VARIABLE (IDENS=1) THEN TH1 AND TH2          *
C*     WILL REPRESENT METAL WEIGHT PER UNIT OF VOLUME INSTEAD OF               *
C*     GRADES.                                                                 *
C*     THE STUDIED REGION IS DIVIDED IN UNIT BLOCKS AND EQUAL LENGTH           *
C*     SEGMENTS ARE EACH IDENTIFIED BY A BLOCK INDICES (I,J,K). THE            *
C*     OUTPUT INFORMATION OF MEG2040 IS STORED ON TAPE4 AND IS ALSO            *
C*     PRINTED ON TAPE2.                                                       *
C*                                                                             *
C*     THIS PROGRAM HAS BEEN WRITTEN IN CDC FORTRAN LEVEL 4.8 AND WAS          *
C*     ORIGINALLY CREATED BY RAYMOND SABOURIN, (EMR, CANMET, MRL),             *
C*     MAY 1982                                                                *
C*                                                                             *
C*     N.B.  THIS PROGRAM DOES NOT REQUIRE VARIABLE DIMENSIONS!                *
C*                                                                             *
C*****************************************************************************
C*                                                                             *
C*                                                                             *
C*****************************************************************************
C*                                                                             *
C*                                                                             *
C******OPTIONS READ ON INPUT                                                  *
C*                                                                             *
C*     CARD 1 - IXYZ, NX, NY, NZ, IT1, IT2, IDENS, IZONE, IBE                  *
C*              FORMAT READ IS (7I5,R3,R1)                                     *
C*         IXYZ   - OPTION WHICH ENABLES THE PROGRAM TO REJECT CERTAIN         *
C*                  SEGMENTS ACCORDING TO THEIR AZIMUTH AND DIP!               *
C*                  IXYZ WILL ALLOW USER TO STUDY THOSE SEGMENTS WITH          *
C*                  AZIMUTH AND DIP FOUND WITHIN CERTAIN INTERVALS!            *
C*                  IF IXYZ=0, ALL SEGMENTS ARE ACCEPTABLE!                    *
C*                  IF IXYZ=1, ALL SEGMENTS WITH ABS(DIP).LE.45                *
C*                  DEGREES AND WITH AZIMUTH FOUND WITHIN THE CLOSED           *
C*                  INTERVALS DENOTED BY (/45,135/)U(/225,315/) ARE            *
```

```
C*                  RETAINED FOR ANALYSIS;
C*                  IF IXYZ=2, ALL SEGMENTS WITH ABS(DIP).LE.45
C*                  DEGREES AND WITH AZIMUTH FOUND WITHIN THE
C*                  INTERVALS DENOTED BY (/0,45)U(135,225)U(315,360/)
C*                  ARE KEPT;
C*                  IF IXYZ=3, ALL DIPS GREATER THAN 45 DEGREES ARE
C*                  USED;
C*          NX,NY,NZ - NUMBER OF BLOCKS TO BE CONSIDERED IN EACH
C*                  DIRECTION WITH RESPECT TO REFERENCE POINT;
C*          IT1,IT2 - REFERENCE CODES FOR METALS TO BE USED (I.E.
C*                  URANIUM=1, THORIUM=3, ETC. SEE GUIDE FOR CODING
C*                  SUMMARY; - EPR/MRL 82-42 (TR),P.24);
C*                  DEFAULT VALUES ARE;  IT1=1 (URANIUM)
C*                                       IT2=3 (THORIUM);
C*          IDENS   - OPTION ALLOWING THE USE OF METAL PER UNIT OF
C*                  VOLUME (IDENS=1) INSTEAD OF GRADES (IDENS=0);
C*          IZONE   - ZONE CODE (SEE OPTION CARD 2).
C*                  ORIGINAL SEGMENTS WITH ZONE CODE EQUAL TO IZONE AND
C*                  ADJACENT SEGMENTS WITH ZONE CODE EQUAL TO BLANK,
C*                  W OR FL WILL BE INCLUDED WITHIN THE ZONE.
C*                  IZONE IS LEFT BLANK WHEN THE OPTION IS NOT USED;
C*          IBE     - IBE=B IF THE NEW EQUAL LENGHT SEGMENTS ARE
C*                  CREATED FROM THE BOTTOM OF THE ZONE.
C*                  IF IBE=T, THEY WILL BE CREATED FROM THE TOP OF THE
C*                  ZONE.
C*                  IBE IS LEFT BLANK WHEN IZONE IS NOT USED;
C*
C*  CARD 2 - SEG, ELEV, PRX1, PRY1, PRZ, SX, SY, SZ
C*           FORMAT READ IS (8F10.2)
C*       SEG     - LENGTH OF EQUAL NEW SEGMENTS; NEW COORDINATES WILL
C*                 REPRESENT THE MIDPOINTS OF THESE SEGMENTS;
C*                 THE NEW EQUAL LENGTH SEGMENTS WILL BE CREATED
C*                 ALONG THE VERTICAL PROJECTION OF A DRILL HOLE IF
C*                 IZONE IS USED. THE COORDINATES (XM,YM) OF THESE
C*                 NEW SEGMENTS WILL ALL BE THE SAME. XM=(XI+XF)/2
C*                 AND YM=(YI+YF)/2. WHERE (XI,YI) AND (XF,YF) ARE THE
C*                 COORDINATES OF THE DRILL HOLE AT THE BEGINNING AND
C*                 THE END OF THE CHOSEN ZONE.
C*                 IF IZONE IS NOT USED THE NEW SEGMENTS WILL BE
C*                 CREATED USING THE APPARENT LENGTH OF SEGMENTS
C*                 ALONG THE DRILL HOLE;
C*       ELEV    - IF ELEV.GT.0.0, IT REPRESENTS THE REFERENCE
C*                    ELEVATIUN FROM WHICH MEASURED SEGMENTS ARE TO
C*                    BE CREATED. DRILL HOLES MUST BE VERTICAL.
C*                 IF ELEV.EQ.0.0 (DEFAULT), THE MEASURED EQUAL LENGHT
C*                    SEGMENTS WILL BE CREATED FROM THE COLLAR OR
C*                    BEGINNING OF DRILL-HOLE.
C*                    THE PROGRAM CHANGES ELEV TO 99.9 WHEN IZONE IS
C*                    USED.
C*                 IF ELEV.LT.0.0, NEW EQUAL LENGTH SEGMENTS WILL BE
C*                    CREATED FROM THE COLLAR BUT ANY REAL SEGMENT
C*                    HAVING A LENGTH EQUAL TO 'SEG' WILL BE
C*                    PRESERVED. MEASURED SEGMENTS CAN HAVE A LENGTH
C*                    LESS THAN 'SEG' WITH THIS PROCEDURE; THE PURPOSE
C*                    BEING TO PRESERVE AS MANY REAL SEGMENTS OF
C*                    LENGTH 'SEG' AS POSSIBLE.
C*       PRX1,PRY1,PRZ - THREE DIMENSIONAL COORDINATES FOR REFERENCE
```

```
C*                    POINT OF THE GRID SYSTEM;  BLOCK INDICES WILL BE    *
C*                    ASSIGNED TO EACH SAMPLE WITH RESPECT TO THIS        *
C*                    POINT AND TO ROTATED SYSTEM OF AXIS;                *
C*          SX,SY,SZ - DIMENSIONS OF UNIT BLOCK;                          *
C*                    DIMENSIONS OF STUDIED FIELD WILL BE SX*NX BY        *
C*                    SY*NY BY SZ*NZ;                                     *
C*                    SAMPLES OUTSIDE THIS FIELD OF STUDY WILL BE         *
C*                    REJECTED;                                           *
C*                                                                        *
C*      CARD 3 - ALFA                                                     *
C*               FORMAT READ IS (8F10.2)                                  *
C*               WHEN CARD 3 IS NOT SPECIFIED ALFA WILL NOT BE USED;      *
C*           ALFA   - ANGLE OF ROTATION FOR REFERENCE SYSTEM (X/Y PLANE); *
C*                    IF ALFA.GT.0, ROTATION IS APPLIED IN COUNTER-       *
C*                    CLOCKWISE DIRECTION FROM X AXIS.                    *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C******FILES USED                                                         *
C*                                                                        *
C*      TAPE1  - INPUT DATA CARDS                                         *
C*      TAPE2  - OUTPUT LISTING                                           *
C*               SECTION 1 OPTIONS APPLIED ARE PRINTED.                   *
C*               SECTION 2 LIST OF DETAILED RESULTS OF THE PROGRAM IS     *
C*                         PRINTED.                                       *
C*      TAPE3  - MEG1000 OR MEG1600 UNFORMATED FILE                       *
C*      TAPE4  - MEG2040 OUTPUT FILE                                      *
C*                       RECORDING STATEMENT IS                           *
C*                       WRITE(4,102) IUDN,NN,LJ,LI,I,J,K,XM,YM,ZM,SEG,   *
C*                       TH1,TH2,TH3                                      *
C*                       102 FORMAT(1X,R7,6I5,4F14.3,3F14.4)              *
C*      TAPE5  - SCRATCH FILE                                             *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C******REQUIRED SUBROUTINES                                               *
C*                                                                        *
C*      MEG2041 - GETS LOCATION OF INDEX WITHIN IPAC. (METAL CODE)        *
C*      MEG2042 - ROTATION ALFAM                                          *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C*                                                                        *
C**************************************************************************
C*                                                                        *
C******VARIABLES USED                                                     *
C*                                                                        *
C*      IUDN   - SEVEN CHARACTERS DRILL HOLE LABEL (R7);                  *
C*      NN     - NUMBER OF ORIGINAL SEGMENTS FROM WHICH THE NEW SEGMENT   *
C*               IS CREATED;                                              *
C*      LJ     - IF THE END OF AN ORIGINAL SEGMENT IS ALSO THE END OF     *
```

```
C*                THE CREATED SEGMENT, THEN LJ=0, OTHERWISE LJ=1;
C*      LI      - IF THE BEGINNING OF AN ORIGINAL SEGMENT IS ALSO THE
C*                BEGINNING OF THE CREATED SEGMENT THEN LI=0, OTHERWISE
C*                LI=1;
C*      I,J,K   - INDICES OF BLOCK CONTAINING MIDPOINT OF NEW SEGMENT;
C*                THE INDICES ARE COMPUTED FROM THE REFERENCE POINT AND
C*                FROM THE ROTATED SYSTEM OF AXIS;
C*      XM,YM,ZM - COORDINATES FOR MIDPOINT OF SEGMENT;
C*                  COORDINATES CALCULATED FROM THE ORIGINAL SYSTEM OF
C*                  AXIS;
C*      SEG     - LENGTH OF NEW SEGMENT;
C*      TH1,TH2 - VALUES CORRESPONDING TO METAL CODES IT1 AND IT2.
C*                IF IDENS=0, THESE VALUES REPRESENT METAL GRADES;
C*                IF IDENS=1, THEY REPRESENT METAL PER UNIT OF VOLUME;
C*      TH3     - DENSITY VALUES;
C*
C*
C******OUTPUT VARIABLES
C*
C*      NS      - ORIGINAL NUMBER OF SEGMENTS PER DRILL HOLE;
C*      MM      - NUMBER OF SEGMENTS CREATED FOR A GIVEN DRILL HOLE;
C*      MMM     - TOTAL NUMBER OF SEGMENTS CREATED BY PROGRAM;
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C******EXECUTION
C*
C*      H2040,CM75000,T500,IO500,P2.
C*      ACCOUNT,*****.
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=****,MR=1.
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2040,
C*      PFNI=                    ,PERMANENT FILE OUTPUT CREATED BY
C*                                PROGRAM MEG1000 OR MEG1600.
C*      PFNO=                    ,PERMANENT FILE NAME OF OUTPUT FILE.
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C******DECLARATION OF VARIABLES
C*
C*********************************************************************
C*
C*
      REAL    LONG,LONGD,LONGC,LONG1,REEL(9),RGRADE(7)
      INTEGER INT(8),IAM(7),ICM(7),IDATE(6),ICO(7)
C*
C*
C*********************************************************************
C*
C******MAIN-LINE PROGRAM BODY
C*
C*********************************************************************
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

MEG2040 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 1
NAME _____

CARD NO. 1

IXYZ	NX	NY	NZ	IT1	IT2	IDENS	IZONE	IBE
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 38	39

FORMAT(7I5,R3,R1)

CARD NO. 2

SEG	ELEV	PRX1	PRY1	PRZ	SX	SY	SZ
1 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80

FORMAT(8F10.2)

CARD NO. 3

ALFA

FORMAT(F10.2) N.D. CARD NO. 3 MAY NOT BE SPECIFIED WHEN ALFA = 0.0.

1 — 10

EXECUTION:
```
H2040,CM75000,T500,IO500,P2.
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2040,
PFNI=                    ,(PERMANEMT FILE NAME OF OUTPUT FILE
                         CREATED BY MEG1000 OR MEG1600)
PFNO=                    . (PERMANENT FILE NAME OF MEG2040 OUTPUT FILE)
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2040 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 10-5-82
PAGE 1 OF 1
NAME RS

CARD NO. 1

IXYZ	NX	NY	NZ	IT1	IT2	IDENS	IZONE	IBE
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 38	39
0	50	50	200	1	3	0		

FORMAT(7I5,R3,R1)

CARD NO. 2

SEG	ELEV	PRX1	PRY1	PRZ	SX	SY	SZ
1 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80
2.5	0.0	7100.0	8000.0	0.0	25.0	25.0	25.0

FORMAT(8F10.2)

CARD NO. 3 (NOT USED)

ALFA FORMAT(F10.2) N.D. CARD NO. 3 MAY NOT BE SPECIFIED WHEN ALFA = 0.0.

1 — 10

EXECUTION:
```
H2040,CM75000,T500,IO500,P2.
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2040,
PFNI=MEG1600ZZX      ,(PERMANEMT FILE NAME OF OUTPUT FILE
                       CREATED BY MEG1000 OR MEG1600)
PFNO=MEG2040ZZX      . (PERMANENT FILE NAME OF MEG2040 OUTPUT FILE)
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	IAYZ=	0	OPTION ALLOWING USER TO REJECT VALUES FOR AZIMUTH AND DIP OF SEGMENTS THAT ARE FOUND WITHIN CERTAIN RANGES (UNUSED WHEN EQUAL TO ZERO)!
	NX=	50	
	NY=	50	
	NZ=	200	INDICES OF LAST BLOCK ALONG EACH RESPECTIVE AXIS!
	IT1=	1	
	IT2=	3	CODES OF METALS TO BE USED (DEFAULTS ARE URANIUM=1, THORIUM=3)!
	IDENS=	0	CHOICE OF METAL PER UNIT OF VOLUME (IDENS=1) OR GRADES (IDENS=0) FOR THE VALUES OF TH1 AND TH2!
	IZONE=		ZONE CODE ADJACENT CODE OF ZONE TO BE STUDIED. W. BLANK AND FL CODES ARE AUTOMATICALLY ACCEPTED BY THE PROGRAM!
	IBE=		
2	SEG=	2.5000	SEGMENT LENGTH TO BE CREATED!
	ELEV=	0.000	REFERENCE ELEVATION FROM WHICH SEGMENTS ARE TO BE DEFINED!
	PHX1=	7400.000	
	PHY1=	8000.000	
	PHZ=	0.000	REFERENCE POINT COORDINATES FOR THE GRID OF UNIT BLOCKS!
	SX=	25.0000	
	SY=	25.0000	
	SZ=	25.0000	DIMENSIONS OF UNIT BLOCK!

SECTION 2 - DETAILED RESULTS OF THE PROGRAM

DESCRIPTION OF RESULTS

IUDN - DRILL HOLE LABEL;
NN - NUMBER OF ORIGINAL SEGMENTS USED TO EVALUATE NEW SEGMENTS;
LJ - LJ=0 WHEN THE END OF A NEW SEGMENT COINCIDES WITH THE END OF AN ORIGINAL SEGMENT; OTHERWISE LJ=1;
LI - LI=0 WHEN THE BEGINNING OF A NEW SEGMENT COINCIDES WITH THE BEGINNING OF AN ORIGINAL SEGMENT, OTHERWISE LI=1;
I,J,K - INDICES OF BLOCK CONTAINING MIDPOINT OF NEW SEGMENT;
XM,YM,ZM - COORDINATES FOR MIDPOINT OF SEGMENT;
LENGTH - LENGTH OF NEW SEGMENT;
TH1,TH2 - VALUES FOR METAL GRADES OR METAL PER UNIT OF VOLUME;
TH3 - DENSITY VALUES;

48 ORIGINAL SEGMENT(S) FROM DRILL HOLE ZZX0009

METAL INDICES USED ARE: 1 2

IUDN	NN	LJ	LI	I	J	K	XM	YM	ZM	LENGTH	TH1	TH2	TH3

774 SEGMENT(S) OF 2.50 FEET WERE CREATED FROM DRILL-HOLE ZZX0009

58 ORIGINAL SEGMENT(S) FROM DRILL HOLE ZZX0038

METAL INDICES USED ARE: 1 2

IUDN	NN	LJ	LI	I	J	K	XM	YM	ZM	LENGTH	TH1	TH2	TH3
ZZX0038	1	0	1	8	29	49	7600.000	8722.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8720.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8717.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8715.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8712.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8710.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	2	1	1	8	29	49	7600.000	8707.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	29	49	7600.000	8705.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	2	1	1	8	29	49	7600.000	8702.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	2	1	1	8	29	49	7600.000	8700.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8697.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8695.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8692.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8690.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	2	1	1	8	28	49	7600.000	8687.550	1210.500	2.500	.4880	0.0000	.0833
ZZX0038	2	1	1	8	28	49	7600.000	8685.050	1210.500	2.500	.9272	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8682.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8680.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8677.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	28	49	7600.000	8675.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8672.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8670.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8667.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8665.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8662.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8660.050	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8657.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	1	8	27	49	7600.000	8655.050	1210.500	2.500	0.0000	0.0000	.0833

ZZA0038	1	1	1	8	26	49	7600.000	8647.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	26	49	7600.000	8645.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	A	26	49	7600.000	8642.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	A	26	49	7600.000	8640.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	2	1	1	8	26	49	7600.000	8637.550	1210.500	2.500	.2448	0.0000	.0833
ZZA0038	3	1	1	8	26	49	7600.000	8635.050	1210.500	2.500	6.1616	0.0000	.0833
ZZA0038	2	1	1	8	26	49	7600.000	8632.550	1210.500	2.500	12.3776	0.0000	.0833
ZZA0038	2	1	1	8	26	49	7600.000	8630.050	1210.500	2.500	10.1640	0.0000	.0833
ZZA0038	3	1	1	8	26	49	7600.000	8627.550	1210.500	2.500	.6496	0.0000	.0833
ZZA0038	3	1	1	A	26	49	7600.000	8625.050	1210.500	2.500	3.9280	0.0000	.0833
ZZA0038	2	1	1	8	25	49	7600.000	8622.550	1210.500	2.500	2.0384	0.0000	.0833
ZZA0038	2	1	1	8	25	49	7600.000	8620.050	1210.500	2.500	.4416	0.0000	.0833
ZZA0038	3	1	1	8	25	49	7600.000	8617.550	1210.500	2.500	2.3760	0.0000	.0833
ZZA0038	3	1	1	8	25	49	7600.000	8615.050	1210.500	2.500	2.4512	0.0000	.0833
ZZA0038	1	1	1	8	25	49	7600.000	8612.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	25	49	7600.000	8610.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	25	49	7600.000	8607.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	A	25	49	7600.000	8605.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	3	1	1	8	25	49	7600.000	8602.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	2	1	1	A	25	49	7600.000	8600.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	0	8	24	49	7600.000	8597.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	0	1	8	24	49	7600.000	8595.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	24	49	7600.000	8592.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	24	49	7600.000	8590.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	24	49	7600.000	8587.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	24	49	7600.000	8585.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	24	49	7600.000	8582.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	3	1	1	8	24	49	7600.000	8580.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	2	1	1	8	24	49	7600.000	8577.550	1210.500	2.500	.0448	0.0000	.0833
ZZA0038	2	1	1	8	24	49	7600.000	8575.050	1210.500	2.500	1.4560	0.0000	.0833
ZZA0038	3	1	1	8	23	49	7600.000	8572.550	1210.500	2.500	.6608	0.0000	.0833
ZZA0038	1	1	1	8	23	49	7600.000	8570.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	8	23	49	7600.000	8567.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	A	23	49	7600.000	8565.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	2	1	1	8	23	49	7600.000	8562.550	1210.500	2.500	.7168	0.0000	.0833
ZZA0038	3	1	1	8	23	49	7600.000	8560.050	1210.500	2.500	5.3896	0.0000	.0833
ZZA0038	2	1	1	8	23	49	7600.000	8557.550	1210.500	2.500	5.3408	0.0000	.0833
ZZA003A	2	1	1	8	23	49	7600.000	8555.050	1210.500	2.500	1.7053	0.0000	.0833
ZZA0038	2	1	1	8	23	49	7600.000	8552.550	1210.500	2.500	2.5114	0.0000	.0833
ZZA0038	1	1	1	9	23	49	7600.000	8550.050	1210.500	2.500	2.9600	0.0000	.0833
ZZA0038	2	1	1	9	22	49	7600.000	8547.550	1210.500	2.500	2.8800	0.0000	.0833
ZZA0038	1	1	1	9	22	49	7600.000	8545.050	1210.500	2.500	2.4600	0.0000	.0833
ZZA0038	1	1	1	9	22	49	7600.000	8542.550	1210.500	2.500	2.4600	0.0000	.0833
ZZA003A	2	1	1	9	22	49	7600.000	8540.050	1210.500	2.500	1.2792	0.0000	.0833
ZZA0038	2	1	1	9	22	49	7600.000	8537.550	1210.500	2.500	.5616	0.0000	.0833
ZZA0038	1	1	1	9	22	49	7600.000	8535.050	1210.500	2.500	1.5600	0.0000	.0833
ZZA0038	2	1	0	9	22	49	7600.000	8532.550	1210.500	2.500	4.3320	0.0000	.0833
ZZA0038	1	0	1	9	22	49	7600.000	8530.050	1210.500	2.500	7.8600	1.6600	.0833
ZZA0038	2	1	1	9	22	49	7600.000	8527.550	1210.500	2.500	9.0744	.1992	.0833
ZZA0038	2	1	1	9	22	49	7600.000	8525.050	1210.500	2.500	4.5360	0.0000	.0833
ZZA0038	2	1	1	9	21	49	7600.000	8522.550	1210.500	2.500	4.3016	0.0000	.0833
ZZA0038	2	1	1	9	21	49	7600.000	8520.050	1210.500	2.500	3.9928	.3648	.0833
ZZA0038	4	1	1	9	21	49	7600.000	8517.550	1210.500	2.500	6.1160	.1824	.0833
ZZA0038	2	1	1	9	21	49	7600.000	8515.050	1210.500	2.500	1.5616	.3072	.0833
ZZA0038	3	1	1	9	21	49	7600.000	8512.550	1210.500	2.500	2.4920	.1280	.0833
ZZA0038	3	1	1	9	21	49	7600.000	8510.050	1210.500	2.500	1.3448	.1728	.0833
ZZA0038	3	1	1	9	21	49	7600.000	8507.550	1210.500	2.500	.8392	.0864	.0833
ZZA0038	2	1	1	9	21	49	7600.000	8505.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	2	1	1	9	21	49	7600.000	8502.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	9	21	49	7600.000	8500.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA0038	1	1	1	9	20	49	7600.000	8497.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	9	20	49	7600.000	8495.050	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	9	20	49	7600.000	8492.550	1210.500	2.500	0.0000	0.0000	.0833
ZZA003A	1	1	1	9	20	49	7600.000	8490.050	1210.500	2.500	0.0000	0.0000	.0833

ZZX0038	1	1	1	9	20	49	7600.000	8482.550	1210.500	2.500	0.0000	0.0000	.0833
ZZX0038	1	1	0	9	20	49	7600.000	8480.400	1210.500	1.800	0.0000	0.0000	.0833

97 SEGMENT(S) OF 2.50 FEET WERE CREATED FROM DRILL-HOLE ZZX003A

871 SEGMENT(S) OF 2.50 FEET WERE CREATED BY THIS PROGRAM

REFERENCES

1. Boyle, R., "Program MEG1000 User's Guide - CADD System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-96(TR), CANMET, Energy, Mines and Resources Canada; 1982.

2. Boyle, R., "Program MEG1600 User's Guide - CADD System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-99(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

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Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

ERP – MRL

82-105 TR

Energy, Mines and Resources Canada | Énergie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology | Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2050 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

This document is an modified interim report prepared primarily for circulation and internal reference purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

Ce document est un rapport provisoire revisé et rédigé principalement pour la diffusion et la documentation internes. Il ne représente nullement l'opinion définitive du Centre canadien de la technologie des minéraux et de l'énergie (CANMET)

28 pp

ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

DIVISION REPORT ERP/MRL 82-105(TR)

PROGRAM MEG2050 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2050 is to calculate the arithmetic and logarithmic mean and variance of variable values (grade, metal or tonnage per unit volume) of drillhole segments located within the same unit block. These results can be used either by MEG2055 for a conventional reserve evaluation or by MEG2300 for a geostatistical reserve evaluation. MEG2050 can be applied to two or three dimensional variables.

The input file of MEG2050 is provided by MEG2040 or MEG2010.

The documentation of this program is technical and subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2040
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2050 est de calculer la moyenne et la variance arithmétique et logarithmique de variables telles que la teneur, la quantité de métal ou de tonnage par unité de volume appartenant à des segments de forages d'égale longueur et positionnés à l'intérieur d'un même volume unitaire. Les résultats de MEG2050 peuvent être utilisés par MEG2055 pour une évaluation conventionnelle des réserves ou par MEG2300 pour un évaluation géostatistique, MEG2050 peut être éxécuté avec des variables bi-dimensionnelles ou tri-dimensionnelles. Le fichier d'entrée de MEG2050 est fourni par MEG2040 ou MEG2010.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      PROGRAM MEG2050(INPUT,OUTPUT,TAPE1=INPUT,TAPE2=OUTPUT,TAPE4=/304,
     -                TAPE5=/304,TAPE6,TAPE7=/304)
C*
C*
C*********************************************************************
C*                                                                   *
C******GENERAL DESCRIPTION                                           *
C*                                                                   *
C*     PROGRAM MEG2050 CALCULATES THE ARITHMETIC AND LOGARITHMIC MEAN *
C*     AND VARIANCE OF VARIABLES VALUES (FOR EXAMPLE, GRADE, METAL AND *
C*     TONNAGE PER UNIT OF VOLUME, ETC.) WITHIN UNIT BLOCKS. THESE   *
C*     RESULTS AS WELL AS THE NUMBER OF OBSERVATIONS PER BLOCKS CAN BE *
C*     USED FOR FURTHER GEOSTATISTICAL ANALYSIS. THIS PROGRAM CAN BE *
C*     APPLIED TO TWO OR THREE DIMENSIONAL VARIABLES. THE VARIABLE   *
C*     VALUES WHERE RECORDED ON TAPE4 BY PROGRAMS MEG2010 OR MEG2040 *
C*     RESPECTIVELY. ALL SEGMENTS OR COMPOSITE INTERSECTIONS ARE SORTED*
C*     (USING SORT/MERGE INSTRUCTIONS FOUND IN SUBROUTINE SORTP)     *
C*     ACCORDING TO BLOCK INDICES (I,J,K). THE SEGMENTS ARE THEN READ *
C*     FROM THE SORTED FILE TAPE5. BLOCK INDICES ARE COMPUTED IN THIS *
C*     PROGRAM FOR A TWO DIMENSIONAL STUDY. IN THIS CASE THE NUMBER  *
C*     OF BLOCKS ALONG EACH AXIS HAVE TO BE SPECIFIED IN INPUT. BLOCK *
C*     INDICES CAN ONLY BE CHANGED FOR A 3 DIMENSIONAL STUDY IF A NEW *
C*     REFERENCE POINT (XREF,YREF,ZREF), NEW BLOCK DIMENSIONS        *
C*     (XD,YD,ZD) AND ROTATION ANGLES ARE SPECIFIED. THE KRIGE       *
C*     RELATIONSHIP IS COMPUTED AND ITS VALIDITY IS VERIFIED. ALL    *
C*     USEFUL OUTPUT DATA ARE RECORDED ON TAPE6 AND PRINTED ON THE   *
C*     LISTING. THIS PROGRAM HAS BEEN WRITTEN IN CDC FORTRAN LEVEL 4.8 *
C*     AND WAS CREATED BY RAYMOND SABOURIN (EMR, CANMET, MRL), MAY 1982*
C*                                                                   *
C*********************************************************************
C*                                                                   *
C*                                                                   *
C*********************************************************************
C*                                                                   *
C******OPTIONS READ ON INPUT                                         *
C*                                                                   *
C*     CARD 1 - IOUT,IJK,GRMIN                                       *
C*              FORMAT READ IS (2I5,F10.4)                           *
C*         IOUT   - IF IOUT=1 ONLY BLOCK STATISTICS ARE PRINTED ON   *
C*                  OUTPUT;                                          *
C*                  IF IOUT=0 SORTED SEGMENTS OR COMPOSITES          *
C*                  INTERSECTIONS WILL BE PRINTED ALONG WITH THEIR   *
C*                  CORRESPONDING BLOCK STATISTICS;                  *
C*         IJK    - REJECT THE SEGMENTS IF THE VALUE OF TH1(IJK) IS  *
C*                  .LT. GRMIN; TH1(IJK) IS THE VALUE OF THE IJK'TH  *
C*                  VARIABLE;                                        *
C*         GRMIN  - MINIMUM ACCEPTABLE VALUE OF VARIABLE IJK I.E. OF *
C*                  TH1(IJK);                                        *
C*                                                                   *
C*     CARD 2 - NOPT,XREF,YREF,ZREF,XD,YD,ZD                         *
C*              FORMAT READ IS (I5,6F10.0)                           *
C*         NOPT   - IF NOPT=0, BLOCK DIMENSIONS AND REFERENCE POINT OF *
C*                  GRID SYSTEM ARE THE SAME AS THOSE GIVEN IN       *
C*                  MEG2040;                                         *
C*                  IF NOPT=1, NEW BLOCK INDICES WILL BE REDEFINED   *
C*                  ACCORDING TO SPECIFIED REFERENCE POINT, BLOCK    *
C*                  DIMENSIONS AND ROTATION ANGLES ALFA AND BETA;    *
```

```
C*                    (MUST BE EQUAL TO 1 IF IDIM=2 (CARD 3).
C*                   IF IDIM=3, NOPT COULD BE EQUAL TO 1 OR 0.
C*          XREF,YREF,ZREF - COORDINATES OF REFERENCE POINT USED IN
C*                   DEFINING NEW BLOCKS;
C*                    THESE VALUES ARE TAKEN AS THE SMALLEST ACCEPTABLE
C*                    COORDINATES ALONG EACH AXIS (REJECTED);
C*          XD,YD,ZD - DIMENSIONS OF NEW BLOCKS;
C*
C*      CARD 3 - NUM,IDIM,IDENC
C*               FORMAT READ IS (I5,I1,R1)
C*           NUM    - NUMBER OF OBSERVED VARIABLES;
C*                    (MAXIMUM IS 15, BUT MUST BE EQUAL TO 5 IF IDIM=2)
C*                    HOWEVER NUM MUST BE AT LEAST 3 IF IDIM=3
C*           IDIM   - NUMBER OF DIMENSIONS TO BE CONSIDERED (2 OR 3)
C*           IDENC - CONSTANT DENSITY OR VARIABLE DENSITY
C*                    IF IDENC=N, DENSITY VARIES
C*                    IF IDENC=Y, DENSITY IS CONSTANT
C*
C*      CARD 4 - VARIA(J) (MAXIMUM OF 15 VARIABLES)
C*               FORMAT READ IS (8A10)
C*           VARIA - NAME OF OBSERVED VARIABLES. EACH VARIABLE NAME IS A
C*                   COMMENT OF 80 CHARACTERS. THE NUMBER OF CARDS TO
C*                   READ IS NUM.
C*
C*      CARD 5 - NDX,NDY,NDZ,ALFA,BETA
C*               FORMAT READ IS (3I5,2F10.0)
C*               OPTIONAL CARD (SEE DEFAULTS APPLIED)
C*           NDX,NDY,NDZ - NUMBER OF ACCEPTABLE BLOCKS ALONG EACH
C*                   RESPECTIVE AXIS; ALL BLOCKS HAVING AN INDEX
C*                   GREATER THAN THE PERMISSIBLE NUMBER OF BLOCKS WILL
C*                   BE REJECTED.
C*                   IF THESE VALUES EQUAL ZERO OR IF CARD IS NOT READ,
C*                   ALL BLOCKS WILL BE TAKEN AS LONG AS THEY HAVE
C*                   POSITIVE INDICES;
C*           ALFA, BETA - ANGLES OF ROTATION (DEGREES) FOR COORDINATES
C*                   IN X/Y AND Y/Z PLANES RESPECTIVELY.
C*                   ALFA ROTATION IS APPLIED BEFORE BETA.
C*                   POSITIVE ANGLE VALUES CORRESPOND TO COUNTER-
C*                   CLOCKWISE ROTATIONS.
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******FILES USED
C*
C*      TAPE1 - INPUT FILE OF DATA CARDS
C*      TAPE4 - INPUT FILE OF MEG2050 CREATED BY MEG2010, MEG2040 ETC
C*              INPUT VARIABLES FOR MEG2040
C*              IWDN      - DRILL-HOLE LABEL
C*              I,J,K     - INDICES OF SEGMENTS
C*              XM,YM,ZM - THREE DIMENSIONAL COORDINATES OF CENTER-POINT
C*              SEG        - SEGMENT LENGTH
C*              THI        - ARRAY CONTAINING UP TO A MAXIMUM OF 15
C*                           DIFFERENT VARIABLES. THE NAME OF EACH
C*                           VARIABLE IS READ ON CARD 4.
```

```
      C*              INPUT READ STATEMENTS IS:                              *
      C*                    READ(4,1025) IUDN,I,J,K,XM,YM,ZM,SEG,NUM,        *
      C*                                 (TH1(L),L=1,NUM)                    *
      C*              1025  FORMAT(1X,R7,15X,3I5,4F14.3,=(F14.4))            *
      C*              INPUT VARIABLES FOR MEG2010                            *
      C*                    READ(4,1026) UND,DEDT1,LATIT1,ELEVA1,THICK1,DENS1*
      C*                                 GRADE1,METAL1,TON1                  *
      C*              1026  FORMAT(R7,4F10.1,2F10.3,F10.4)                   *
      C*     TAPE2 - OUTPUT LISTING                                          *
      C*     SECTION 1 - OPTIONS APPLIED ARE PRINTED;                        *
      C*     SECTION 2 - DETAILED COMPUTED BLOCK RESULTS ARE PRINTED;        *
      C*     SECTION 3 - KRIGE RELATIONSHIP FOR EACH VARIABLE IS PRINTED;    *
      C*                                                                     *
      C*********************************************************************
      C*
      C*
      C*********************************************************************
      C*                                                                     *
      C******OUTPUT VALUES                                                  *
      C*                                                                     *
      C*              OUTPUT WRITE STATEMENT                                 *
      C*                    WRITE(6,1076)                                    *
      C*              1076  FORMAT(1X,4I5,3F15.5,/,5F15.5)                   *
      C*                                                                     *
      C*     I1,J1,K1 - INDICES OF BLOCK (NEW INDICES IF CARD NO.2 WAS       *
      C*                READ);                                               *
      C*     N1       - NUMBER OF SEGMENT MIDPOINTS FOUND WITHIN BLOCK;      *
      C*                BLOCK IS NOT USED FOR OVERALL STATISTICS WHEN N1.LE.3;*
      C*     T1       - ARITHMETIC MEAN OF VARIABLE VALUES PER BLOCK;        *
      C*     PMX,PMY,PMZ - MIDPOINT OF BLOCK CONTAINING PRINTED SAMPLE;      *
      C*     VAR      - ARITHMETIC VARIANCE OF VARIABLE VALUES PER BLOCK;    *
      C*     TL1      - AVERAGE OF LOGARITHMIC VALUES PER BLOCK;             *
      C*     VARL     - VARIANCE OF LOGARITHMIC VALUES PER BLOCK;            *
      C*     NN1      - TOTAL NUMBER OF OBSERVATIONS;                        *
      C*     NB       - TOTAL NUMBER OF BLOCKS IN ORE-DEPOSIT                *
      C*                WITH AT LEAST FOUR SEGMENTS;                         *
      C*     VMBG     - AVERAGE VARIANCE OF SEGMENTS IN A BLOCK;             *
      C*     VLMBG    - AVERAGE LOGARITHMIC VARIANCE OF SEGMENTS IN A BLOCK; *
      C*     VARBG    - VARIANCE OF BLOCKS IN ORE-DEPOSIT;                   *
      C*     VARBGL   - LOG. VAR. OF BLOCKS IN ORE-DEPOSIT;                  *
      C*     VARSG    - VARIANCE OF SEGMENTS IN ORE-DEPOSIT;                 *
      C*     VARSGL   - LOG. VAR. OF SEGMENTS IN ORE-DEPOSIT;                *
      C*     PREC     - PRECISION (NORMAL CASE);                             *
      C*     PRECL    - PRECISION (LOG. NORMAL CASE).                        *
      C*                                                                     *
      C*********************************************************************
      C*
      C*
      C*********************************************************************
      C*                                                                     *
      C******REQUIRED SUBROUTINES                                           *
      C*                                                                     *
      C*     MEG2052 - TO EXECUTE THE COORDINATES ROTATIONS ALFA AND BETA.   *
      C*     SORTP   - TO SORT CODED DATA FROM TAPE4 ONTO TAPE5.             *
      C*                                                                     *
      C*********************************************************************
      C*                                                                     *
```

```
C*
C*****************************************************************
C*
C******EXECUTION                                                 *
C*                                                               *
C*      H2050,CM130000,T300,IO400,P2.                            *
C*      ACCOUNT,*****.                                           *
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.          *
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2050,                       *
C*      PFNI=                , PERMANENT FILE NAME OF INPUT FILE *
C*                                   CREATED BY PROGRAM MEG2040. *
C*      PFNO=                . PERMANENT FILE NAME OF OUTPUT FILE (MEG2050)*
C*                                                               *
C*****************************************************************
C*
C*                                                               *
C*****************************************************************
C*
C******DECLARATION OF VARIABLES                                  *
C*                                                               *
C*****************************************************************
C*
C*                                                               *
      REAL     TH1(15),ST1(15),ST2(15),STL1(15),STL2(15),VAR(15),VARL(15)
     -         ,T1(15),TL1(15),ST1G(15),ST2G(15),STH1GL(15),STH2GL(15),
     -         STH1G(15),STH2G(15),ST1GL(15),ST2GL(15),VMBG(15),VLMBG(15)
      REAL LATIT1,METAL1
      INTEGER ITIV1(4)
      INTEGER ITIV2(4)
      INTEGER VARIA(15,8),UDN
      COMMON/FICH/IN
      DATA ITIV1/4HTH1(,4HTH1(,4HTH1(,4HTH1(/
      DATA ITIV2/2H)=,2H)=,2H)=,2H)=/
C*
C*                                                               *
C*****************************************************************
C*
C******MAIN-LINE PROGRAM BODY                                    *
C*                                                               *
C*****************************************************************
C*
      IN=4
C*
C******READ AND PRINT INPUT OPTIONS
C*
C******CARD 1
C*
      READ(1,1045) IOUT,IJK,GRMIN
C*
      PRINT 1000,IOUT,IJK,GRMIN
      PI=3.14159265359
C*
C******CARD 2
C*
      READ(1,1015) NOPT,XREF,YREF,ZREF,XD,YD,ZD
C*
      WRITE(2,1060) NOPT,XREF,YREF,ZREF,XD,YD,ZD
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

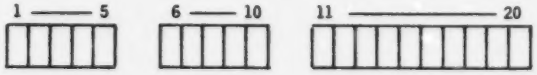
MEG2050 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 2
NAME _____

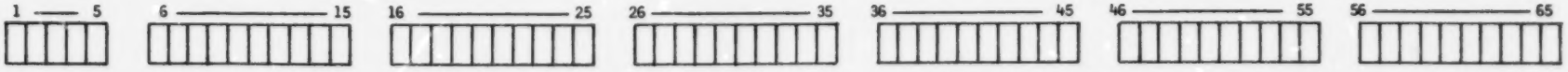
CARD NO. 1

IOUT IJK GRMIN FORMAT(2I5,F10.4)



CARD NO. 2

NOPT XREF YREF ZREF XD YD ZD



FORMAT(I5,6F10.0)

CARD NO. 3

NUM IDIM IDENC FORMAT(I5,I1,R1)

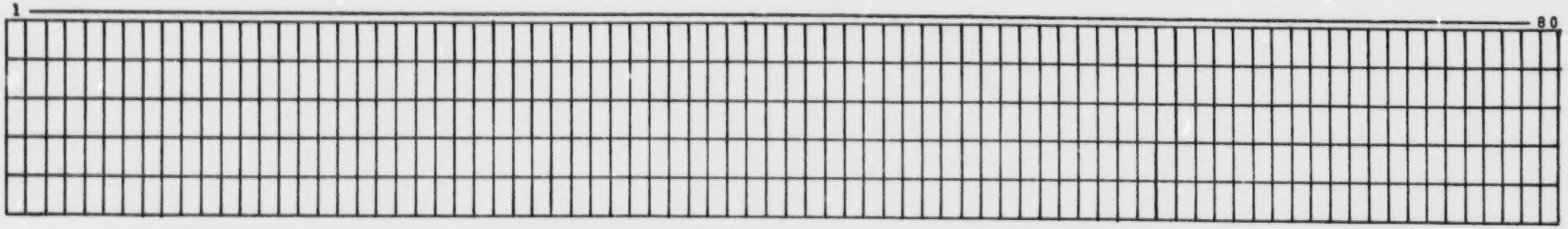
MEG2050 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 2 OF 2
NAME _____

CARD NO. 4

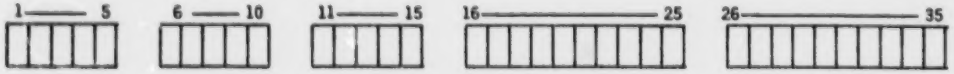
((VARIA(J,I),I=1,8),J=1,NUM) ,NUM CARDS MUST BE READ. FORMAT(8A10)



8

CARD NO. 5

NDX NDY NDZ ALFA BETA FORMAT(3I5,2F10.0)



EXECUTION:
```
H2020,CM130000,T300,IO400,P2,
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2050,
PFNI=                    ,(PERMANENT FILE NAME OF MEG2040 OUTPUT FILE)
PFNO=                    .(PERMANENT FILE NAME OF MEG2050 OUTPUT FILE)
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

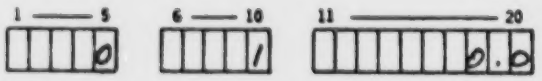
MEG2050 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 10-5-82
PAGE 1 OF 2
NAME RS

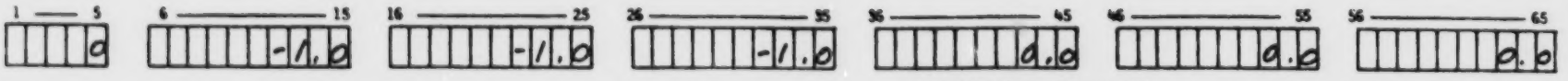
CARD NO. 1

IOUT IJK GRMIN FORMAT(2I5,F10.4)



CARD NO. 2

NOPT XREF YREF ZREF XD YD ZD



FORMAT(I5,6F10.0)

CARD NO. 3

NUM IDIM IDENC FORMAT(I5,I1,R1)

10

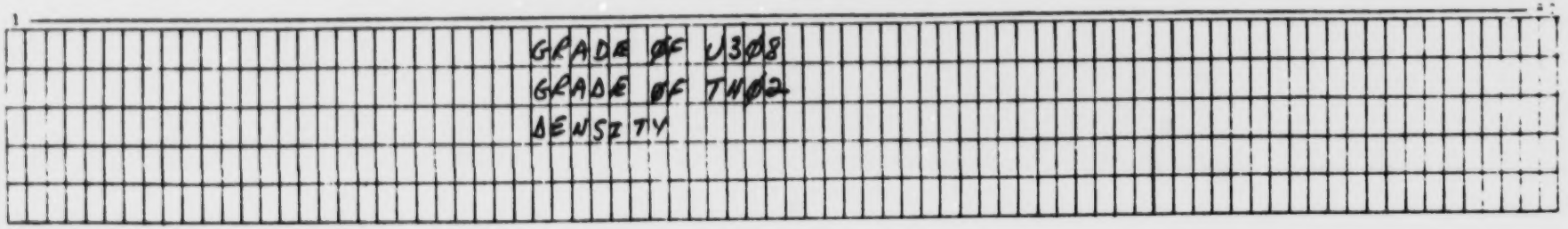
MEG2050 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 10-5-82
PAGE 2 OF 2
NAME RS

CARD NO. 4

((VARIA(J,I),I=1,8),J=1,NUM) ,NUM CARDS MUST BE READ. FORMAT(8A10)



CARD NO. 5

NDX NDY NDZ ALFA BETA FORMAT(3I5,2F10.0)

EXECUTION: H2020,CM130000,T300,IO400,P2,
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2050,
PFNI=MEG2040 22x ,(PERMANENT FILE NAME OF MEG2040 OUTPUT FILE)
PFNO=MEG2050 22x .(PERMANENT FILE NAME OF MEG2050 OUTPUT FILE)

SECTION 1 - OPTIONS APPLIED

CARD	OPTION			DESCRIPTION
1	IOUT=	0		PRINTING OPTION TO DETERMINE WHETHER SORTED BLOCK SAMPLES ARE TO BE PRINTED (IOUT=0) OR NOT (IOUT=1);
	IJK=	1		INDICE OF VARIABLE USED FOR THE SAMPLE REJECTION TEST;
	GMMIN=	0.0000		SMALLEST ACCEPTABLE VALUE FOR TH1(IJK);
2	NOPT=	0		OPTION ALLOWING A REDEFINITION OF BLOCK INDICES;
	XREF=	-1.0000		
	YREF=	-1.0000		
	ZREF=	-1.0000		COORDINATES OF REFERENCE POINT;
	XD=	0.00000		
	YD=	0.00000		
	ZD=	0.00000		RESPECTIVE BLOCK DIMENSIONS;
3	NUM=	4		NUMBER OF OBSERVED VARIABLES;
	IU1M=	3		NUMBER OF DIMENSIONS TO BE CONSIDERED;
	IDENC=	Y		CONSTANT DENSITY OR VARIABLE DENSITY IF IDENC=N, DENSITY VARIES IF IDENC=Y, DENSITY IS CONSTANT;
4	VARIA=			OBSERVED VARIABLES;
	TH1(1)=		GRADE OF U3O8	
	TH1(2)=		GRADE OF THO2	
	TH1(3)=		DENSITY	
5	NOX=	999999		
	NOY=	999999		
	NOZ=	999999		NUMBER OF ACCEPTABLE BLOCKS ALONG EACH RESPECTIVE AXIS;
	ALFA=	0.0000		
	BETA=	0.0000		ANGLES OF ROTATION FOR COORDINATE SYSTEM;

SECTION 2 - DETAILED COMPUTED BLOCK RESULTS

DESCRIPTION OF RESULTS

I,J,K	- INDICE OF SORTED BLOCKS;
IUDN	- SEVEN CHARACTER DRILL HOLE LABEL (A7);
XM,YM,ZM	- COORDINATES FOR SEGMENT MIDPOINTS;
SEG	- SEGMENT LENTH;
TMI(1- 3)	- VARIABLE VALUES;
NI	- NUMBER OF SEGMENT FOUND WITHIN BLOCK;
TI(1- 3)	- ARITHMETIC MEAN OF VARIABLE VALUES WITHIN BLOCK;

- THREE DIMENSIONS (X,Y,Z) ARE CONSIDERED FOR THIS STUDY -

I= 8 J= 29 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	8717.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8722.5	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8707.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8720.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8712.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8702.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8715.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8705.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8710.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8700.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= .00050
T1(2)= .00050
T1(3)= .08330

I= 8 J= 28 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	8677.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8697.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8675.0	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8687.6	1210.5	2.5	TH1(1)=	.4880	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8692.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8682.5	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8695.0	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8685.1	1210.5	2.5	TH1(1)=	.9272	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8690.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8680.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= .14192
T1(2)= .00050
T1(3)= .08330

I= 8 J= 27 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	8657.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8667.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8652.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8672.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8655.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8662.5	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8650.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8670.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8665.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	8660.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= .00050
T1(2)= .00050
T1(3)= .08330

I= 8 J= 26 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A637.6	1210.5	2.5	TH1(1)=	.2448	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A647.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A627.6	1210.5	2.5	TH1(1)=	.6496	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A642.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A632.6	1210.5	2.5	TH1(1)=	12.3776	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A645.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A625.1	1210.5	2.5	TH1(1)=	3.9280	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A640.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A635.0	1210.5	2.5	TH1(1)=	6.1616	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A630.1	1210.5	2.5	TH1(1)=	10.1640	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= 3.35276
T1(2)= .00050
T1(3)= .08330

I= 8 J= 25 K= .49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A617.6	1210.5	2.5	TH1(1)=	2.3760	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A622.5	1210.5	2.5	TH1(1)=	2.0384	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A607.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A620.1	1210.5	2.5	TH1(1)=	.4416	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A612.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A602.5	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A615.0	1210.5	2.5	TH1(1)=	2.4512	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A605.0	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A610.0	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A600.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= .73102
T1(2)= .00050
T1(3)= .08330

I= 8 J= 24 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A597.5	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A577.6	1210.5	2.5	TH1(1)=	.0448	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A587.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A575.0	1210.5	2.5	TH1(1)=	1.4560	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A592.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A582.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A595.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A585.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A590.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	
ZZA0038	7600.0	A580.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833	

N1= 10
T1(1)= .15048
T1(2)= .00050
T1(3)= .08330

I= 8 J= 23 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A557.6	1210.5	2.5	TH1(1)=	5.3408	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A567.6	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A552.6	1210.5	2.5	TH1(1)=	2.5114	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A572.6	1210.5	2.5	TH1(1)=	.6608	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A555.0	1210.5	2.5	TH1(1)=	1.7053	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A562.5	1210.5	2.5	TH1(1)=	.7168	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A570.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A565.1	1210.5	2.5	TH1(1)=	0.0000	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A560.1	1210.5	2.5	TH1(1)=	5.3896	TH1(2)=	0.0000	TH1(3)=	.0833

N1= 9
T1(1)= 1.81402
T1(2)= .00050
T1(3)= .08330

I= 9 J= 23 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A550.0	1210.5	2.5	TH1(1)=	2.9600	TH1(2)=	0.0000	TH1(3)=	.0833

N1= 1
T1(1)= 2.96000
T1(2)= .00050
T1(3)= .08330

I= 9 J= 22 K= 49

IUDN	XM	YM	ZM	SEG							
ZZA0038	7600.0	A537.5	1210.5	2.5	TH1(1)=	.5616	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A547.6	1210.5	2.5	TH1(1)=	2.8800	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A527.6	1210.5	2.5	TH1(1)=	9.0744	TH1(2)=	.1992	TH1(3)=	.0833
ZZA0038	7600.0	A542.5	1210.5	2.5	TH1(1)=	2.4600	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A532.6	1210.5	2.5	TH1(1)=	4.3320	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A545.1	1210.5	2.5	TH1(1)=	2.4600	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A525.1	1210.5	2.5	TH1(1)=	4.5360	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A540.1	1210.5	2.5	TH1(1)=	1.2792	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A535.0	1210.5	2.5	TH1(1)=	1.5600	TH1(2)=	0.0000	TH1(3)=	.0833
ZZA0038	7600.0	A530.1	1210.5	2.5	TH1(1)=	7.8600	TH1(2)=	1.6600	TH1(3)=	.0833

N1= 10
T1(1)= 3.70032
T1(2)= .18432
T1(3)= .08330

I= 9 J= 21 K= 49

ZZA0038	7600.0	A517.6	1210.5	2.5 TH1(1)=	6.1160 TH1(2)=	.1824 TH1(3)=	.0833
ZZA0038	7600.0	A522.6	1210.5	2.5 TH1(1)=	4.3016 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A507.6	1210.5	2.5 TH1(1)=	.8392 TH1(2)=	.0864 TH1(3)=	.0833
ZZA0038	7600.0	A520.1	1210.5	2.5 TH1(1)=	3.9928 TH1(2)=	.3648 TH1(3)=	.0833
ZZA0038	7600.0	A512.6	1210.5	2.5 TH1(1)=	2.4920 TH1(2)=	.1280 TH1(3)=	.0833
ZZA0038	7600.0	A502.5	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A515.1	1210.5	2.5 TH1(1)=	1.5616 TH1(2)=	.3072 TH1(3)=	.0833
ZZA0038	7600.0	A505.1	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A510.1	1210.5	2.5 TH1(1)=	1.3448 TH1(2)=	.1728 TH1(3)=	.0833
ZZA0038	7600.0	A500.1	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833

N1=	10
T1(1)=	2.06495
T1(2)=	.12436
T1(3)=	.08330

I= 9 J= 20 K= 49

IUDN	XM	YM	ZM	SEG			
ZZA0038	7600.0	A497.6	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A487.6	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A492.6	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A482.5	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A495.0	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A485.1	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A490.0	1210.5	2.5 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833
ZZA0038	7600.0	A480.4	1210.5	1.8 TH1(1)=	0.0000 TH1(2)=	0.0000 TH1(3)=	.0833

N1=	A
T1(1)=	.00050
T1(2)=	.00050
T1(3)=	.08330

SECTION 3 - KRIGE RELATIONSHIP FOR EACH VARIABLE

VARIABLE NO. 1: GRADE OF U3O8

TOTAL NUMBER OF SEGMENTS IN ORE-DEPOSIT	:	97
TOTAL NUMBER OF BLOCKS IN ORE-DEPOSIT (WITH AT LEAST FOUR SEGMENTS)	:	10
VARIANCE OF SEGMENTS IN ORE-DEPOSIT	:	5.68432
VARIANCE OF BLOCKS IN ORE-DEPOSIT	:	2.08577
VARIANCE OF SEGMENTS IN A BLOCK	:	4.14348
VARIANCE OF BLOCKS IN ORE-DEPOSIT + VARIANCE OF SEGMENTS IN A BLOCK	:	6.22925
FORMULA PRECISION (NORMAL CASE)	:	-9.58649
LOG. VAR. OF SEGMENTS IN ORE-DEPOSIT	:	14.80314
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT	:	1.28256
LOG. VAR. OF SEGMENTS IN A BLOCK	:	9.19626
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT + LOG. VAR. OF SEGMENTS IN A BLOCK	:	10.47882
FORMULA PRECISION (LOG. NORMAL CASE)	:	29.21218

VARIABLE NO. 2: GRADE OF THO2

TOTAL NUMBER OF SEGMENTS IN ORE-DEPOSIT	:	97
TOTAL NUMBER OF BLOCKS IN ORE-DEPOSIT (WITH AT LEAST FOUR SEGMENTS)	:	10
VARIANCE OF SEGMENTS IN ORE-DEPOSIT	:	.03136
VARIANCE OF BLOCKS IN ORE-DEPOSIT	:	.00450
VARIANCE OF SEGMENTS IN A BLOCK	:	.02987
VARIANCE OF BLOCKS IN ORE-DEPOSIT + VARIANCE OF SEGMENTS IN A BLOCK	:	.03438
FORMULA PRECISION (NORMAL CASE)	:	-9.63053
LOG. VAR. OF SEGMENTS IN ORE-DEPOSIT	:	6.31782
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT	:	.63904
LOG. VAR. OF SEGMENTS IN A BLOCK	:	1.91248
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT + LOG. VAR. OF SEGMENTS IN A BLOCK	:	2.55153
FORMULA PRECISION (LOG. NORMAL CASE)	:	59.61377

VARIABLE NO. 31 DENSITY

TOTAL NUMBER OF SEGMENTS IN ORE-DEPOSIT	:	97
TOTAL NUMBER OF BLOCKS IN ORE-DEPOSIT (WITH AT LEAST FOUR SEGMENTS)	:	10
VARIANCE OF SEGMENTS IN ORE-DEPOSIT	:	.00000
VARIANCE OF BLOCKS IN ORE-DEPOSIT	:	0.00000
VARIANCE OF SEGMENTS IN A BLOCK	:	.00000
VARIANCE OF BLOCKS IN ORE-DEPOSIT + VARIANCE OF SEGMENTS IN A BLOCK	:	.00000
FORMULA PRECISION (NORMAL CASE)	:	45.73413
LOG. VAR. OF SEGMENTS IN ORE-DEPOSIT	:	.00000
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT	:	.00000
LOG. VAR. OF SEGMENTS IN A BLOCK	:	.00000
LOG. VAR. OF BLOCKS IN ORE-DEPOSIT + LOG. VAR. OF SEGMENTS IN A BLOCK	:	.00000
FORMULA PRECISION (LOG. NORMAL CASE)	:	-82.51488

REFERENCES

1. Sabourin, R.L., "Program MEG2040 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-104(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

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Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

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Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

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82-106 TR

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Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2055 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin and R. Boyle
Mine Evaluation Group

October 1982

This document is an unedited interim report prepared [illegible] for discussion and internal reporting purposes. It [illegible] represent a final expression [illegible] opinion of the Canada [illegible] Mineral and Energy Technology (CANMET)

Ce [illegible] rapport [illegible] rédigé [illegible] [illegible] nulle- [illegible] de [illegible] canadien de [illegible] des minéraux et de l'énergie (CANMET)

43 pp

ENERGY RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT ERP/MRL 82-106(TR)

PROGRAM MEG2055 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin* and R. Boyle**

ABSTRACT

The purpose of program MEG2055 is to calculate the local and global reserve of a mineral deposit using variables defined within dimensional unit blocks. The mineralized envelope of a deposit is defined using criteria such as minimum grade of the intersections within a block, minimum number of intersections per block and minimum number of measured blocks within a predefined zone of influence. The mineralized envelope is composed of measured and estimated blocks. The global tonnage, metal and grade is computed first for a minimum grade and optionally for 30 additional cut-off grades. The tonnage, metal and average grade can be estimated by the moving average method or by the inverse distance method. The input file or program MEG2055 is provided by MEG2050.

The documentation of this program is technical and subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2055
SYSTÈME GEM - SYSTÈME CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin* and R. Boyle**

RÉSUMÉ

Le but du programme MEG2055 est de calculer les réserves locales et globales d'un gisement minier utilisant des variables définies à l'intérieur de volume unitaire. L'enveloppe minéralisée du gisement est définie en utilisant des critères tels que la teneur moyenne minimum des segments à l'intérieur d'un volume, le nombre minimum de segments par volume et le nombre minimum de volume mesurés à l'intérieur d'une zone d'influence prédéfinie. L'enveloppe minéralisée est composée de volumes unitaires dits mesurés et estimés. Les quantitiés globales de tonnage et de métal ainsi que la teneur moyenne du gisement sont d'abord calculées pour une teneur minimum et ensuite optionnellement pour trente teneurs de coupure additionnelles. Ces quantités ainsi que la teneur moyenne peuvent être estimées par la méthode de la moyenne mobile ou par la méthode de l'inverse des distances. Le fichier d'entrée de MEG2055 est fourni par MEG2050.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2055(X,Y,VAR,TONI,XZS,YZS,IPL,K4,K5,K6,K7)
C*
C*
C*************************************************************************
C*                                                                       *
C*                                                                       *
C******GENERAL DESCRIPTION                                              *
C*                                                                       *
C*     PROGRAM MEG2055 FINDS A MINERALIZED ENVELOPE USING SPECIFIED      *
C*     CRITERIA (MINIMUM GRADE , MINIMUM NUMBER OF INTERSECTIONS PER     *
C*     BLOCK AND MINIMUM NUMBER OF MEASURED BLOCKS WITHIN A ZONE OF      *
C*     INFLUENCE) AND CALCULATES THE TONNAGE , GRADE AND METAL OF UNITS  *
C*     BLOCKS LEVEL BY LEVEL. THE MINERALIZED ENVELOPE IS COMPOSED OF    *
C*     MEASURED AND ESTIMATED BLOCKS (SEE DEFINITION). THE TONNAGE,      *
C*     METAL AND GRADE ARE COMPUTED FIRST FOR A MINIMUM GRADE (TENMIN)   *
C*     AND OPTIONNALLY FOR UP TO 30 ADDITIONNAL CUT-OFF GRADES. THE      *
C*     TONNAGE , METAL AND AVERAGE GRADE CAN BE ESTIMATED BY THE MOVING  *
C*     AVERAGE OR THE I.D.METHOD. THE PROGRAM PRINTS THE ARITHMETIC      *
C*     MEAN AND VARIANCE, OR LOGARITHMIC MEAN AND VARIANCE CALCULATED    *
C*     IN MEG2050 AS WELL AS THE NUMBER OF INTERSECTIONS. THE TONNAGE    *
C*     AND METAL CONTENT FOR EACH MEASURED AND ESTIMATED BLOCKS FOUND    *
C*     WITHIN THE MINERALIZED ENVELOPE. IT ALSO PRINTS TABLES OF MEASU-  *
C*     RED AND ESTIMATED RESERVES FOR CUT-OFF GRADES LEVEL BY LEVEL AND  *
C*     FOR THE COMPLETE DEPOSIT. SMALL MAPS IDENTIFYING THE MEASURED     *
C*     AND ESTIMATED BLOCKS AND LEVELS ARE PROVIDED BY THE PROGRAM.      *
C*     GRAPHICS OF GRADE-TONNAGE, GRADE-METAL AND GRADE-CUT-OFF GRADE    *
C*     CURVES ARE GIVEN WHEN ALL LEVELS ARE PROCESSED.                   *
C*     THE INPUT DATA, STORED WITH RESPECT TO BLOCK INDICES, ARE READ    *
C*     FROM TAPE1 (FROM MEG2050).                                        *
C*                        A RECTANGULAR ZONE IN THE DEPOSIT IS DEFINED BY*
C*     BLOCK INDICES(NX1,NY1,NIV1) AND (NX2,NY2,NIV2) ALONG EACH AXIS.   *
C*     THE LEVEL OF THE PRINTED BLOCKS (KK) AND THEIR LOWER (ZINF) AND   *
C*     UPPER (ZSUP) ELEVATIONS AS WELL AS THE MEG SERIAL NUMBER          *
C*     (MEGNUM) ARE PRINTED AT THE TOP OF EACH CHART. THESE CHARTS CAN   *
C*     BE JUXTAPOSED TO PRODUCE A FULL MAP. THE REFERENCE POINT (PRX,    *
C*     PRY,PRZ) AND BLOCK DIMENSIONS (SX,XY,SZ) MUST BE THE SAME AS      *
C*     THOSE USED IN MEG2050. THE PROGRAM CAN USE 30 VARIABLES. THIS     *
C*     PROGRAM USES VARIABLE DIMENSIONS. MEG2055 HAS BEEN WRITTEN IN     *
C*     CDC FORTRAN LEVEL 4.8 AND WAS ORIGINALLY CREATED BY RAYMOND SA-   *
C*     BOURIN AND RUSSELL BOYLE (EMR,CANMET,MRL) MAY,1982.               *
C*                                                                       *
C*     N.B. PROGRAM MEG2055 MUST ONLY BE UTILIZED FOR A 3 DIMENSIONAL    *
C*          STUDY.                                                       *
C*************************************************************************
C*                                                                       *
C*                                                                       *
C*************************************************************************
C*                                                                       *
C******DEFINITIONS                                                      *
C*                                                                       *
C*     MEASURED BLOCK - TWO CRITERIA ARE REQUIRED FOR A BLOCK TO BE      *
C*                      CONSIDERED AS MEASURED.                          *
C*                      1)THE BLOCK GRADE HAS TO BE .GE. TO TENMIN       *
C*                      (MINIMUM GRADE).                                 *
C*                      2)THE NUMBER OF INTERSECTIONS WITHIN A BLOCK     *
C*                      HAS TO BE .GE. TO MMI (MINIMUN NUMBER OF         *
C*                      INTERSECTIONS).                                  *
```

```
C*
C*      ESTIMATED BLOCK- TWO CRITERIA ARE REQUIRED FOR A BLOCK TO BE
C*                       ESTIMATED.
C*                       1)THE BLOCK IS NOT A MEASURED BLOCK.
C*                       2)THE NUMBER OF MEASURED BLOCKS IN ITS ZONE
C*                       OF INFLUENCE HAS TO BE .GE. TO MBP(MINIMUM
C*                       NUMBER OF MEASURED BLOCKS).
C*                       A BLOCK GRADE IS ESTIMATED WITH ALL THE
C*                       INFORMATION WITHIN THE BLOCK S ZONE OF
C*                       INFLUENCE. ONLY THE REAL GRADES (NOT ESTIMATED)
C*                       ARE USED TO COMPUTE AN ESTIMATE.
C*
C**************************************************************************
C*
C*
C**************************************************************************
C*
C*
C******OPTIONS READ ON INPUT
C*
C*      CARD 1 - IND, NCOG,IBX,IBY,IBZ,MBP,MNI,IPTAB,NIV1,NIV2,
C*               NX1,NX2,NY1,NY2,MEGNUM,IDENC,IME8
C*               FORMAT READ IS (14I5,R3,R1,I1)
C*           IND    - REPRESENTS THE NUMBER OF VARIABLES TO BE READ FROM
C*                    FILE MEG2050. IND CORRESPONDS TO NUM ON CARD 1 OF
C*                    PROGRAM MEG2050.
C*           NCOG   - NUMBER OF CUT-OFF GRADES USED
C*                    NCOG MUST BE .LE.TO 30
C*           IBX,IBY,IBZ - DETERMINE THE ZONE OF INFLUENCE ASSIGNED TO
C*                    EACH ESTIMATED BLOCK:
C*                    THE ZONE OF INFLUENCE IN DEPARTURE IS (SX * IBX):
C*                    THE ZONE OF INFLUENCE IN LATITUDE IS (SY * IBY):
C*                    THE ZONE OF INFLUENCE IN ELEVATION IS (SZ * IBZ):
C*                    IF IBX=IBY=IBZ=0, NO ESTIMATED BLOCK WILL BE
C*                    EVALUATED:
C*                    IF ONLY IBZ=0, THE PROGRAM WILL USE TWO DIMENSION-
C*                    NAL VARIABLES:
C*           MBP    - MINIMUM NUMBER OF MEASURED BLOCKS IN A ZONE OF
C*                    INFLUENCE. CRITERIA FOR AN ESTIMATED BLOCK.
C*           MMI    - MINIMUM NUMBER OF INTERSECTIONS (SEGMENTS) IN A
C*                    BLOCK.
C*                    MMI IS THE SECOND CRITERIA FOR A MEASURED BLOCK.
C*           IPTAB  - OPTION TO PRINT BLOCK BY BLOCK DETAILED RESULTS
C*                    FOR THE MEASURED AND ESTIMATED BLOCKS.
C*                    IPTAB = 0 DEFAULT BLOCK BY BLOCK DETAILED RESULTS
C*                              ARE NOT PRINTED.
C*                    IPTAB = 1 BLOCK BY BLOCK DETAILED RESULTS ARE
C*                              PRINTED.
C*                    THE MEASURED AND ESTIMATED BLOCKS ARE SURROUNDED
C*                    BY ASTERIXS ON EACH CHART.
C*           NIV1   - LOWEST INDEX LEVEL OF ELEVATION REQUIRED ON OUTPUT
C*           NIV2   - GREATEST INDEX LEVEL OF ELEVATION TO BE PRINTED:
C*           NX1    - INDEX OF FIRST X-BLOCK DESIRED:
C*           NX2    - INDEX OF LAST X-BLOCK DESIRED:
C*           NY1    - INDEX OF FIRST Y-BLOCK:
C*           NY2    - INDEX OF LAST Y-BLOCK:
C*           MEGNUM - MEG SERIES NUMBER FOR BLOCK:
```

```
C*          IDENC  - DENSITY OPTION (TONS/VOLUME)                    *
C*                   IDENC = Y DENSITY IS A CONSTANT (1.0/TONNAGE FACT.)*
C*                   IDENC = N DENSITY VARIES AND IS READ ON DISK FILE. *
C*          IMEB   - OPTION OF METHOD USED TO ESTIMATE BLOCKS          *
C*                   TWO POSSIBILITIES:                               *
C*                   0 -BLOCKS ARE ESTIMATED BY MOVING AVERAGE        *
C*                      METHOD                                        *
C*                   1 -AN INVERSE SQUARED DISTANCE METHOD IS USED    *
C*                                                                    *
C*      CARD 2 - SX,SY,SZ,PRX,PRY,PRZ,TENMIN,TONFAC                  *
C*               FORMAT READ IS (8F10.0)                              *
C*           SX,SY,SZ - DIMENSIONS OF UNIT BLOCKS;                    *
C*           PRX,PRY,PRZ - THREE-DIMENSIONAL COORDINATES OF REFERENCE *
C*                     POINT FOR BLOCK GRID; THIS MUST BE THE SAME    *
C*                     REFERENCE POINT AS THE ONE USED IN MEG2050;    *
C*           TENMIN - MINIMUM GRADE FOR A BLOCK TO BE A MEASURED BLOCK.*
C*                    THE FIRST CUT-OFF GRADE CONSIDERED BY THE PROGRAM.*
C*           TONFAC - TONNAGE FACTOR (CU.FT. PER TON)                 *
C*                                                                    *
C*      CARD 3 - COG  THIS CARD IS NOT REQUIRED WHEN NCOG = 0.        *
C*               FORMAT READ IS (16F5.0)                              *
C*           COG    - CUT-OFF GRADES.                                *
C*                    A MAXIMIM OF 30 VALUES CAN BE SPECIFIED.        *
C*                                                                    *
C**********************************************************************
C*
C*
C**********************************************************************
C*                                                                    *
C*                                                                    *
C******DESCRIPTION OF PARAMETERS                                      *
C*                                                                    *
C*      X       - ARRAY OF DEPARTURES OF EACH BLOCK;                  *
C*      Y       - ARRAY OF LATITUDES OF EACH BLOCK;                   *
C*      VAR     - ARRAY INITIALLY CONTAINING A POSITIVE (+1.0) NUMBER *
C*                FOR EACH BLOCK, AND SUBSEQUENTLY USED FOR U308 GRADES.*
C*      TDNI    - ARRAY CONTAINING THE DENSITY, GRADE, NUMBER OF SAMPLES *
C*                IN A BLOCK AND FINALLY THE CODE (INOUT) FOR A MEASURED *
C*                OR AN ESTIMATED BLOCK.                              *
C*      XZS     - ARRAY OF X-Z SECTION CONTAINING THE PROJECTED DATA FOR *
C*                ONE LEVEL.                                          *
C*      YZS     - ARRAY OF Y-Z SECTION CONTAINING THE PROJECTED DATA FOR *
C*                ONE LEVEL.                                          *
C*      INOUT   - CODE FOR MEASURED OR ESTIMATED BLOCK;               *
C*      IPL     - PRINTS ONE LINE OF PLAN FOR IDENTIFICATION OF BLOCKS *
C*                INSIDE MINERALIZED ENVELOPE;                        *
C*      DENS    - DENSITY OF BLOCKS                                   *
C*                                                                    *
C**********************************************************************
C*
C*
C**********************************************************************
C*                                                                    *
C******VARIABLE DIMENSIONS                                            *
C*                                                                    *
C*      K4 - NUMBER OF BLOCKS ALONG X-AXIS OF CHART;                  *
C*           K4=NX2-NX1+1;                                            *
```

```
C*      K5 - NUMBER OF BLOCKS ALONG Y-AXIS OF CHART;
C*           K5=NY2-NY1+1;
C*      K6 - K6=MAX0(K4,K5)+1;
C*      K7 - NUMBER OF BLOCKS ALONG Z AXIS IN ZONE OF INFLUENCE.
C*           K7=IBZ*2+1;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******FILES USED
C*
C*      TAPE1 - INPUT DISK/FILE PROVIDED BY MEG2050.
C*      TAPE5 - INPUT DATA CARDS;
C*      TAPE6 - OUTPUT LISTING;
C*                  THE OUTPUT LISTING IS DIVISED INTO 7 SECTIONS.
C*          SECTION 1 - OPTIONS APPLIED
C*          SECTION 2 - TABLE OF MEASURED AND ESTIMATED RESERVES FOR
C*                      THE CUT-OFF GRADES FOR A SPECIFIED LEVEL.
C*          SECTION 3 - IDENTIFICATION OF BLOCKS INSIDE THE MINERALIZED
C*                      ENVELOPE OF A LEVEL.
C*          SECTION 4 - MEASURED AND ESTIMATED GRADE FOR EACH BLOCK AT
C*                      THE SPECIFIED LEVEL. (OPTIONAL)
C*                      1)THE AVERAGE GRADE EITHER REAL OR ESTIMATED.
C*                      2)VARIANCE OF SAMPLES IN THE BLOCK.
C*                       -IF THE VALUE IS -99.99 THE AVERAGE GRADE IS
C*                       ESTIMATED IN (1) AND THE REAL GRADE IS 0.0
C*                       -IF THE VALUE IS NEGATIVE (BUT NOT -99.99)
C*                       THE AVERAGE GRADE WAS ESTIMATED AND THE
C*                       ABSOLUTE VALUE OF (2) IS THE REAL GRADE.
C*                      3)THE NUMBER OF INTERSECTIONS WITHIN A BLOCK.
C*                      4)TONNAGE IS PRINTED WHEN VARIABLE IDENC = N.
C*                        BLANKED WHEN VARIABLE IDENC = Y.
C*                      SUMMARY RESULTS OF MEASURED.ESTIMATED AND
C*                      TOTAL RESERVES FOR EACH CUT-OFF GRADES FOR ALL
C*                      LEVELS.
C*          SECTION 6 - OVERALL GRAPHIC REPRESENTATION OF A WEST-EAST
C*                      AND A SOUTH-NORTH SECTION.
C*          SECTION 7 - GRAPHICAL REPRESENTATION OF RESULTS.
C*                      TONNAGE VS CUT-OFF GRADE (MEASURED, ESTIMATED)
C*                      AVG. GRADE VS CUT-OFF GRADE (MEASURED ESTIMATED)
C*                      METAL VS CUT-OFF GRADE (MEASURED ESTIMATED)
C*                      AVG. GRADE VS CUT-OFF GRADE (TOTAL)
C*                      TONNAGE VS CUTT-OFF GRADE (TOTAL)
C*                      METAL VS CUT-OFF GRADE (TOTAL)
C*                      AVG. GRADE VS LOG (E) OF MEASURED TONNAGE
C*                        REGRESSION CURVE AND CORRELATION ARE GIVEN
C*                      AVG. GRADE VS LOG (E) OF ESTIMATED TONNAGE
C*                        REGRESSION CURVE AND CORRELATION ARE GIVEN
C*                      AVG. GRADE VS LOG (E) OF TOTAL TONNAGE
C*                        REGRESSION CURVE AND CORRELATION ARE GIVEN
C*              TAPE2 CAN BE OPTIONALLY CATALOGUED ONTO DISK FILE
C*              CONTAINS CODES REPRESENTING MEASURED (1) OR
C*              ESTIMATED (2) BLOCKS.
C*      THE FIRST RECORD OF EACH PROCESSED LEVEL CONTAINS
C*        KK          LEVEL NUMBER
```

```
C*       NX          NUMBER OF BLOCKS IN DEPARTURE (X) ON LEVEL.          *
C*                   (NUMBER OF CHARACTERS PER RECORD).                   *
C*       NY          NUMBER OF BLOCKS IN LATITUDE (Y) ON LEVEL.           *
C*                   (NUMBER OF RECORDS PER LEVEL).                       *
C*       X(1)        DEPARTURE OF THE SOUTH WEST CORNER OF AREA PROCESSED *
C*                   FROM LEVEL.                                          *
C*       Y(NY+1)     LATITUDE OF THE SOUTH WEST CORNER OF AREA PROCESSED  *
C*                   FROM LEVEL.                                          *
C*       X(NX+1)     DEPARTURE OF THE NORTH EAST CORNER OF AREA PROCESSED *
C*                   FROM LEVEL.                                          *
C*       Y(1)        LATITUDE OF THE NORTH EAST CORNER OF AREA PROCESSED. *
C*                   FROM LEVEL.                                          *
C*     THE FORMAT IS (3I5,4F10.1)                                         *
C*     THE NY FOLLOWING RECORDS REPRESENT THE MEASURED (1) AND            *
C*     ESTIMATED (2) BLOCKS FOR THAT LEVEL.                               *
C*     THE FORMAT IS (=I1) WHERE "=" IS NX.                               *
C*                                                                        *
C************************************************************************
C*
C*
C************************************************************************
C*                                                                        *
C******REQUIRED SUBROUTINES                                              *
C*                                                                        *
C*     MEG2056 - THE MINERALIZED ENVELOPE IS DETERMINED FOR EACH LEVEL.   *
C*     MEG2058 - DATA STORED IN ARE PLOTTED ON THE SAME MAP.              *
C*     MEG2059 - FOUR VARIABLES ARE STORED INTO ONE WORD OF MEMORY.       *
C*     MEG2060 - EQUATION OF REGRESSION AND CORRELATION                   *
C*               ARE COMPUTED.                                            *
C*     MEG2061 - PRINTS 2 SECTIONS (S-N,W-E) FOR EACH SECTION             *
C*     MEG59A  - ENTRY FOR THE SUBROUTINE MEG2059                         *
C*                                                                        *
C************************************************************************
C*
C*
C************************************************************************
C*                                                                        *
C******EXECUTION                                                         *
C*                                                                        *
C*     H2055,CM125000,T200,I0400,P2.                                      *
C*     ACCOUNT,*****.                                                     *
C*     ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=****,MR=1.                    *
C*     BEGIN,GEM,PROCD,PROGRAMIN=MEG2055.                                 *
C*     Q4 IS THE NUMBER OF VERTICAL POINTS.                               *
C*     Q5 IS THE NUMBER OF HORIZONTAL POINTS.                             *
C*     Q6 IS THE MAXIMUM VALUE BETWEEN (Q4 AND Q5) + 1                    *
C*     Q7 IS THE NUMBER OF ELEVATION POINTS.                              *
C*     PFNI=                    .OUTPUT FILE CREATED BY MEG2050.          *
C*                                                                        *
C************************************************************************
C*
C*
C************************************************************************
C*                                                                        *
C******DECLARATION                                                       *
C*                                                                        *
C************************************************************************
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

MEG2055 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 2
NAME _____

CARD NO. 1

IND	NCOG	IBX	IBY	IBZ	MBP	MNI	IPTAB	NIV1	NIV2
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50

NX1	NX2	NY1	NY2	MEGNUM	IDENC	IMEB
51 — 55	56 — 60	61 — 65	66 — 70	71 — 73	74	75

FORMAT(14I5,R3,A1,I1)

8

CARD NO. 2

SX	SY	SZ	PRX	PRY	PRZ	TENMIN	TONFAC
1 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80

FORMAT(8F10.0)

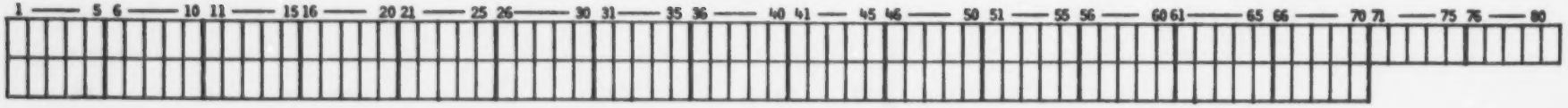
MEG2055 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 2 OF 2
NAME _____

CARD NO. 3

(COG(I),I=2,NCOG1) FORMAT(16F5.0) (NCOG .LE. 30) (NCOG1=NCOG+1)



EXECUTION

```
H2055,CM125000,T200,IO400,P2,
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2055,
Q4=     ,Q5=     ,Q6=     ,Q7=     ,     (SEE VARIABLE DIMENSTIONS IN MEG2055)
PFNI=                              .     (PERMANENT FILE NAME OF MEG2055 INPUT FILE)
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2055 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 17-9-82
PAGE 1 OF 2
NAME RF

CARD NO. 1

IND	NCOG	IBX	IBY	IBZ	MBP	MNI	IPTAB	NIV1	NIV2
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50
1	4	1	1	0	2	3	1	99	99

NX1	NX2	NY1	NY2	MEGNUM	IDENC	IMEB
51 — 55	56 — 60	61 — 65	66 — 70	71 — 73	76	75
20	30	240	250	22X	Y	0

FORMAT(14I5,R3,A1,I1)

CARD NO. 2

SX	SY	SZ	PRX	PRY	PRZ	TENMIN	TONFAC
1 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80
25.0	25.0	25.0	7000.0	2500.0	0.0	0.5	1.5

FORMAT(8F10.0)

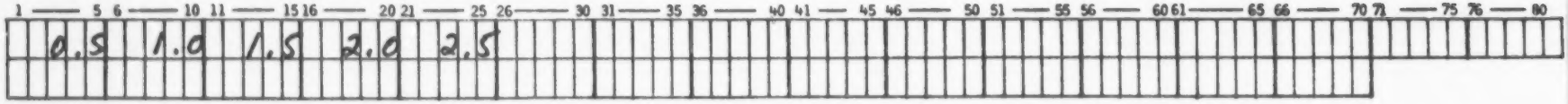
MEG2055 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 17-9-82
PAGE 2 OF 2
NAME RS

CARD NO. 3

(COG(I),I=2,NCOG1) FORMAT(16F5.0) (NCOG1.LE. 30) (NCOG1=NCOG+1)



EXECUTION

```
H2055,CM125000,T200,IO400,P2,
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPL,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2055,
Q4= 20 ,Q5= 20 ,Q6= 21 ,Q7= 1 ,     (SEE VARIABLE DIMENSTIONS IN MEG2055)
PFNI= MEG2050 22X .     (PERMANENT FILE NAME OF MEG2055 INPUT FILE)
```

```
      PROGRAM GEM2055    73/74   OPT=1                    FTN 4.8.528        17/09/82  10.04.38       PAGE     1

 1              PROGRAM GEM2055(INPUT,OUTPUT,TAPE1,TAPE2,TAPE7,TAPE5=INPUT,
               -                TAPE6=OUTPUT)
                INTEGER IPL(20)
                REAL X(21),Y(21)
 5              REAL TONI(20,20,1),VAR(20,20,1)
                INTEGER XZS(20),YZS(20)
           C*    NUMBER OF VERTICAL POINTS
                K4=20
           C*    NUMBER OF HORIZONTAL POINTS
10              K5=20
           C*    THE VALUE OF K6 MUST EQUAL THAT OF 21
                K6=MAX0(K4,K5) + 1
                IF(21.NE.K6) GO TO 10
           C*    K7 NUMBER OF ELEVATION POINTS.
15         C*    K7=IBZ*2+1
                K7=1
                CALL MEG2055(X,Y,VAR,TONI,XZS,YZS,IPL,K4,K5,K6,K7)
                STOP
           10   PRINT20
20         20   FORMAT(*1*,"ERROR IN GIVEN DIMENSIONS"/* *,"VERIFY THAT
               -      21=MAX(20,20)+1")
                STOP
                END
```

SECTION 1 - - OPTIONS APPLIED

CARD	OPTIONS		DESCRIPTION
1	IND=	1	NUMBER OF VARIABLES USED:
	NCOG =	4	NUMBER OF CUTOFF VALUES USED. IF NOT SPECIFIED A DEFAULT CUTOFF VALUE OF 0.005 IS USED
	IBX=	1	ZONE OF INFLUENCE ASSIGNED TO EACH ESTIMATED BLOCK.
	IBY=	1	ZONE OF INFLUENCE IN DEPARTURE IS (SX*(2*IBX+1)).
	IBZ=	0	ZONE OF INFLUENCE IN LATITUDE IS (SY*(2*IBY+1)).
			ZONE OF INFLUENCE IN ELEVATION IS (SZ*(2*IBZ+1)).
	MBP=	2	MINIMUM NUMBER OF MEASURED BLOCKS IN A ZONE OF INFLUENCE. CRITERIA FOR AN ESTIMATED BLOCK
	MMI=	3	MINIMUM NUMBER OF INTERSECTIONS (SEGMENTS) IN A MEASURED BLOCK. MMI IS THE SECOND CRITERIA TO DEFINE A MEASURED BLOCK.
	IPTAB =	1	OPTION TO PRINT CONTOURED CHARTS. IPTAB=1 TABLES (CHARTS) PRINTED. IPTAB=0 CHARTS NOT PRINTED. IPTAR=1 CHARTS PRINTED.
	NIV1=	46	FIRST AND LAST VERTICAL BLOCK LEVELS TO BE PRINTED:
	NIV2=	49	
	NX1=	20	BLOCK RANGE ALONG X-AXIS:
	NX2=	30	
	NY1=	240	BLOCK RANGE ALONG Y-AXIS:
	NY2=	250	
	MEGNUM=	ZZX	MEG SERIES LABEL TO BE USED IN IDENTIFYING THE MINERALIZED ZONE:
	IDENC=	Y	CONSTANT DENSITY (1.0/TONNAGE FACTOR) OR VARIABLE DENSITY IDENC=N DENSITY VARIES IDENC=Y DENSITY = 1.0/TONNAGE FACTOR:
	IMEB=	0	OPTION OF METHOD USED TO ESTIMATE BLOCKS IMEB=0 MOVING AVERAGE METHOD IMEB=1 INVERSE SQUARED DISTANCE METHOD:
2	SX=	25.00000	DIMENSIONS USED FOR DEFINING UNIT BLOCKS:
	SY=	25.00000	
	SZ=	25.00000	
	PHX=	7000.0000	THREE DIMENSIONAL COORDINATES OF REFERENCE POINT USED IN DEFINING BLOCK INDICES:
	PHY=	2500.0000	
	PHZ=	0.0000	
	TENMIN=	.50000	MINIMUM GRADE FOR A BLOCK TO BE MEASURED. THE FIRST CUT-OFF GRADE CONSIDERED BY THE PROGRAM IS TENMIN.

	[illegible]	[illegible]	[illegible]
3	COG=	.5000	CUT-OFF GRADES USED.
			THE FIRST CUTOFF GRADE IS TENMIN.
		1.0000	
		1.5000	
		2.0000	
		2.5000	

SECTION 2 - - TABLE OF MEASURED AND ESTIMATED RESERVES FOR THE CUTOFF GRADES

LEVEL 49 ZINF (FOOTWALL)= 1200.0 ZSUP (HANGINGWALL)= 1225.0 DEPOSIT IDENT. (ZZX)

CUTOFF GRADE .500 LBS U3O8/SHORT TON LEVEL 49

	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	6507.8	2.330	15163.2	5
ESTIMATE	15600.0	1.723	26884.0	12
TOTAL	22107.8	1.902	42047.2	17

CUTOFF GRADE 1.000 LBS U3O8/SHORT TON LEVEL 49

	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	5206.2	2.730	14213.1	4
ESTIMATE	14300.0	1.799	25727.0	11
TOTAL	19506.3	2.047	39940.1	15

CUTOFF GRADE 1.500 LBS U3O8/SHORT TON LEVEL 49

	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	5206.2	2.730	14213.1	4

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL	11706.3	2.490	29150.1	9

CUTOFF GRADE 2.000 LBS U3O8/SHORT TON LEVEL 49

	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	3904.7	3.037	11857.2	3
ESTIMATE	3900.0	2.557	9971.0	3
TOTAL	7804.7	2.797	21828.2	6

CUTOFF GRADE 2.500 LBS U3O8/SHORT TON LEVEL 49

	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	2603.1	3.525	9176.0	2
ESTIMATE	2600.0	2.746	7176.0	2
TOTAL	5203.1	3.143	16352.0	4

SECTION 3 - - IDENTIFICATION OF BLOCKS INSIDE THE MINERALIZED ENVELOPE

AS DEFINED BY THE USERS OPTIONS

LEVEL 49 ZINF (FOOTWALL)= 1200.0 ZSUP (HANGINGWALL)= 1225.0 DEPOSIT IDENT.(ZZX)
MEASURED BLOCK REPRESENTED BY 1
ESTIMATED BLOCK REPRESENTED BY 2

N-W
DEPARTURE 7475.0
LATITUDE 8750.0

N-E
DEPARTURE 7750.0
LATITUDE 8750.0

```
   12345678901
11 I           I 11
10 •           • 10
 9 I           I  9
 8 I           I  8
 7 I   212     I  7
 6 I   212     I  6
 5 I   722     I  5
 4 I    12     I  4
 3 I    212    I  3
 2 I    212    I  2
 1 I           I  1
   12345678901
```

S-W
DEPARTURE 7475.0
LATITUDE 8475.0

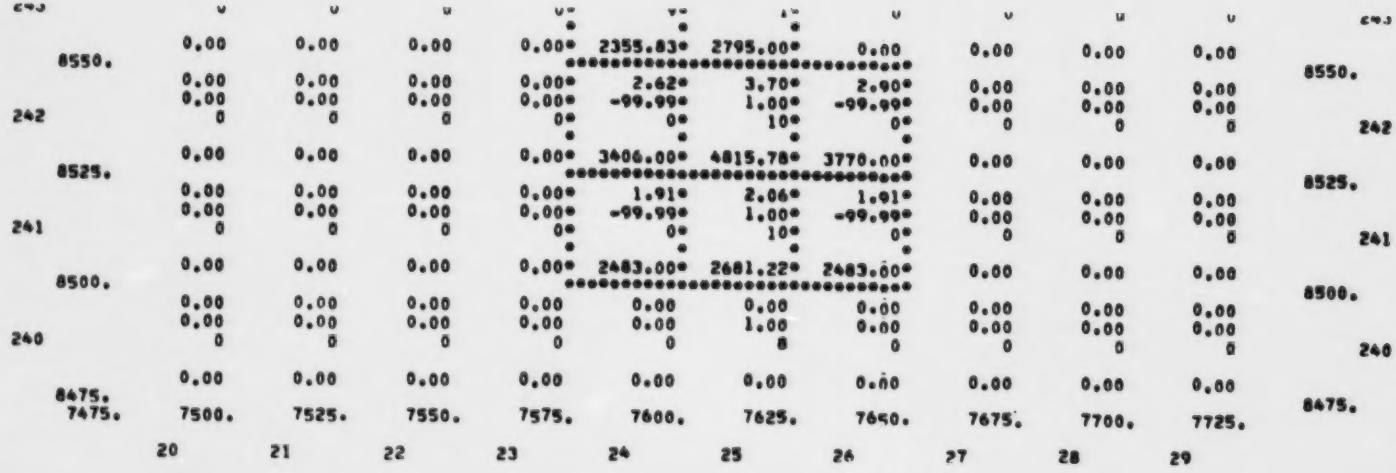
S-E
DEPARTURE 7750.0
LATITUDE 8475.0

SECTION 4 - - MEASURED AND ESTIMATED GRADE FOR EACH BLOCK OF THIS LEVEL

LEVEL 49 ZINF (FOOTWALL)= 1200.0 ZSUP (HANGING WALL)= 1225.0 DEPOSIT IDENT.(ZZX)

(1) AVERAGE GRADE OF SAMPLES IN BLOCK: IF (2) IS >0 (MEASURED BLOCK) IF (2) IS <0 (ESTIMATED BLOCK)
(2) IF >0 DUMMY VARIABLE SET TO 1.0 - IF -99.99 AVERAGE GRADE IS 0 - IF <0 NEGATIVE VALUE OF AVERAGE GRADE
(3) NUMBER OF SAMPLES IN BLOCK
(4) TONNAGE IF IDENC = N - BLANKED IF IDENC = Y
(5) METAL IN LBS.

	20	21	22	23	24	25	26	27	28	29	
7475.	7500.	7525.	7550.	7575.	7600.	7625.	7650.	7675.	7700.	7725.	8750.
8750.											
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
250	0	0	0	0	0	0	0	0	0	0	250
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8725.											8725.
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
249	0	0	0	0	10	0	0	0	0	0	249
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8700.											8700.
	0.00	0.00	0.00	0.00	.14	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
248	0	0	0	0	10	0	0	0	0	0	248
	0.00	0.00	0.00	0.00	182.22	0.00	0.00	0.00	0.00	0.00	
8675.											8675.
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	
247	0	0	0	0	10	0	0	0	0	0	247
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
8650.				**********							8650.
	0.00	0.00	0.00*	1.35*	3.35*	1.35*	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00*	-99.99*	1.00*	-99.99*	0.00	0.00	0.00	0.00	
246	0	0	0*	0*	10*	0*	0	0	0	0	246
			*	*	*	*					
	0.00	0.00	0.00*	1755.00*	4360.23*	1755.00*	0.00	0.00	0.00	0.00	
8625.				**********							8625.
	0.00	0.00	0.00*	1.40*	.73*	1.40*	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00*	-99.99*	1.00*	-99.99*	0.00	0.00	0.00	0.00	
245	0	0	0*	0*	10*	0*	0	0	0	0	245
			*	*	*	*					
	0.00	0.00	0.00*	1820.00*	950.14*	1820.00*	0.00	0.00	0.00	0.00	
8600.				**********							8600.
	0.00	0.00	0.00*	.89*	1.40*	1.40*	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00*	-99.99*	-.15*	-99.99*	0.00	0.00	0.00	0.00	
244	0	0	0*	0*	10*	0*	0	0	0	0	244
			*	*	*	*					
	0.00	0.00	0.00*	1157.00*	1820.00*	1820.00*	0.00	0.00	0.00	0.00	
8575.				**********							8575.
	0.00	0.00	0.00	0.00*	1.81*	2.15*	0.00	0.00	0.00	0.00	

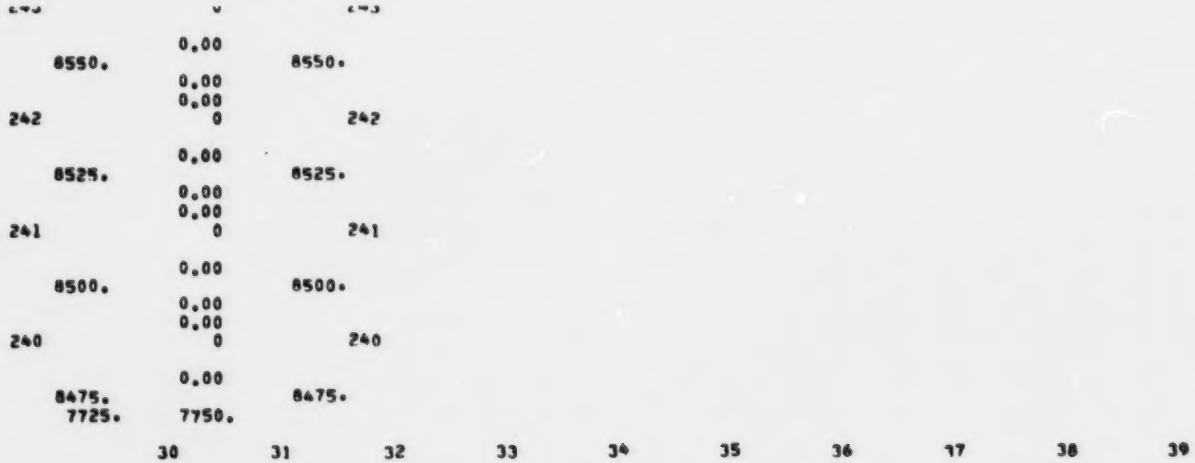

0.00 0.00 0.00 0.00 2355.83 2795.00 0.00 0.00 0.00 0.00
8550.
0.00 0.00 0.00 0.00 2.62 3.70 2.90 0.00 0.00 0.00
0.00 0.00 0.00 0.00 -99.99 1.00 -99.99 0.00 0.00 0.00
242 0 0 0 0 0 10 0 0 0 0 242
0.00 0.00 0.00 0.00 3406.00 4815.78 3770.00 0.00 0.00 0.00
8525.
0.00 0.00 0.00 0.00 1.91 2.06 1.91 0.00 0.00 0.00
0.00 0.00 0.00 0.00 -99.99 1.00 -99.99 0.00 0.00 0.00
241 0 0 0 0 0 10 0 0 0 0 241
0.00 0.00 0.00 0.00 2483.00 2681.22 2483.00 0.00 0.00 0.00
8500.
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
0.00 0.00 0.00 0.00 0.00 1.00 0.00 0.00 0.00 0.00
240 0 0 0 0 0 8 0 0 0 0 240
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
8475.
7475. 7500. 7525. 7550. 7575. 7600. 7625. 7650. 7675. 7700. 7725.
20 21 22 23 24 25 26 27 28 29

SECTION 4 - - MEASURED AND ESTIMATED GRADE FOR EACH BLOCK OF THIS LEVEL

LEVEL 49 ZINF (FOOTWALL)= 1200.0 ZSUP (HANGING WALL)= 1225.0 DEPOSIT IDENT.(ZZX)

```
*******
* (1) *  AVERAGE GRADE OF SAMPLES IN BLOCK: IF (2) IS >0 (MEASURED BLOCK) IF (2) IS <0 (ESTIMATED BLOCK)
* (2) *  IF >0 DUMMY VARIABLE SET TO 1.0  - IF -99.99   AVERAGE GRADE IS 0 - IF <0 NEGATIVE VALUE OF AVERAGE GRADE
* (3) *  NUMBER OF SAMPLES IN BLOCK
* (4) *  TONNAGE IF IDENC = N - BLANKED IF IDENC = Y
* (5) *  METAL IN LBS.
*******
```

	30	31	32	33	34	35	36	37	38	39
	7725.	7750.								
	8750.		8750.							
		0.00								
		0.00								
250		0	250							
		0.00								
	8725.		8725.							
		0.00								
		0.00								
249		0	249							
		0.00								
	8700.		8700.							
		0.00								
		0.00								
248		0	248							
		0.00								
	8675.		8675.							
		0.00								
		0.00								
247		0	247							
		0.00								
	8650.		8650.							
		0.00								
		0.00								
246		0	246							
		0.00								
	8625.		8625.							
		0.00								
		0.00								
245		0	245							
		0.00								
	8600.		8600.							
		0.00								
		0.00								
244		0	244							
		0.00								
	8575.		8575.							
		0.00								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8550.
8550.
0.00
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241
0
241
0.00
8500.
8500.
0.00
0.00
240
0
240
0.00
8475.
8475.
7725.
7750.
30
31
32
33
34
35
36
37
38
39

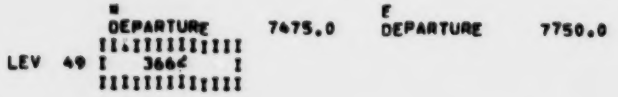
SECTION 5 - - SUMMARY RESULTS OF MEASURED AND ESTIMATED RESERVES FOR THE CUTOFF GRADES AND ALL LEVELS

	CUTOFF GRADE (LBS/SHORT TON)	TONNAGE (SHORT TONS)	GRADE (LBS U3O8/SHORT TON)	METAL (LBS U3O8)	NUMBER OF BLOCKS
MEASURED	.50	6507.8	2.330	15163.2	5
ESTIMATED	.50	15600.0	1.723	26884.0	12
TOTAL	.50	22107.8	1.902	42047.2	17
MEASURED	1.00	5206.2	2.730	14213.1	4
ESTIMATED	1.00	14300.0	1.799	25727.0	11
TOTAL	1.00	19506.3	2.047	39940.1	15
MEASURED	1.50	5206.2	2.730	14213.1	4
ESTIMATED	1.50	6500.0	2.298	14937.0	5
TOTAL	1.50	11706.3	2.490	29150.1	9
MEASURED	2.00	3904.7	3.037	11857.2	3
ESTIMATED	2.00	3900.0	2.557	9971.0	3
TOTAL	2.00	7804.7	2.797	21828.2	6

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ESTIMATED	2.50	2600.0	2.760	7176.0	2
TOTAL	2.50	5203.1	3.143	16352.0	4

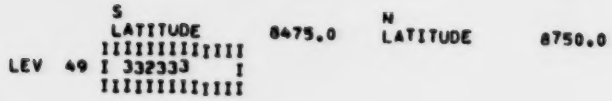
SECTION 6 - - TWO DIMENSIONAL PROJECTION VIEW OF LEVELS PROCESSED

(WEST-EAST SECTION)



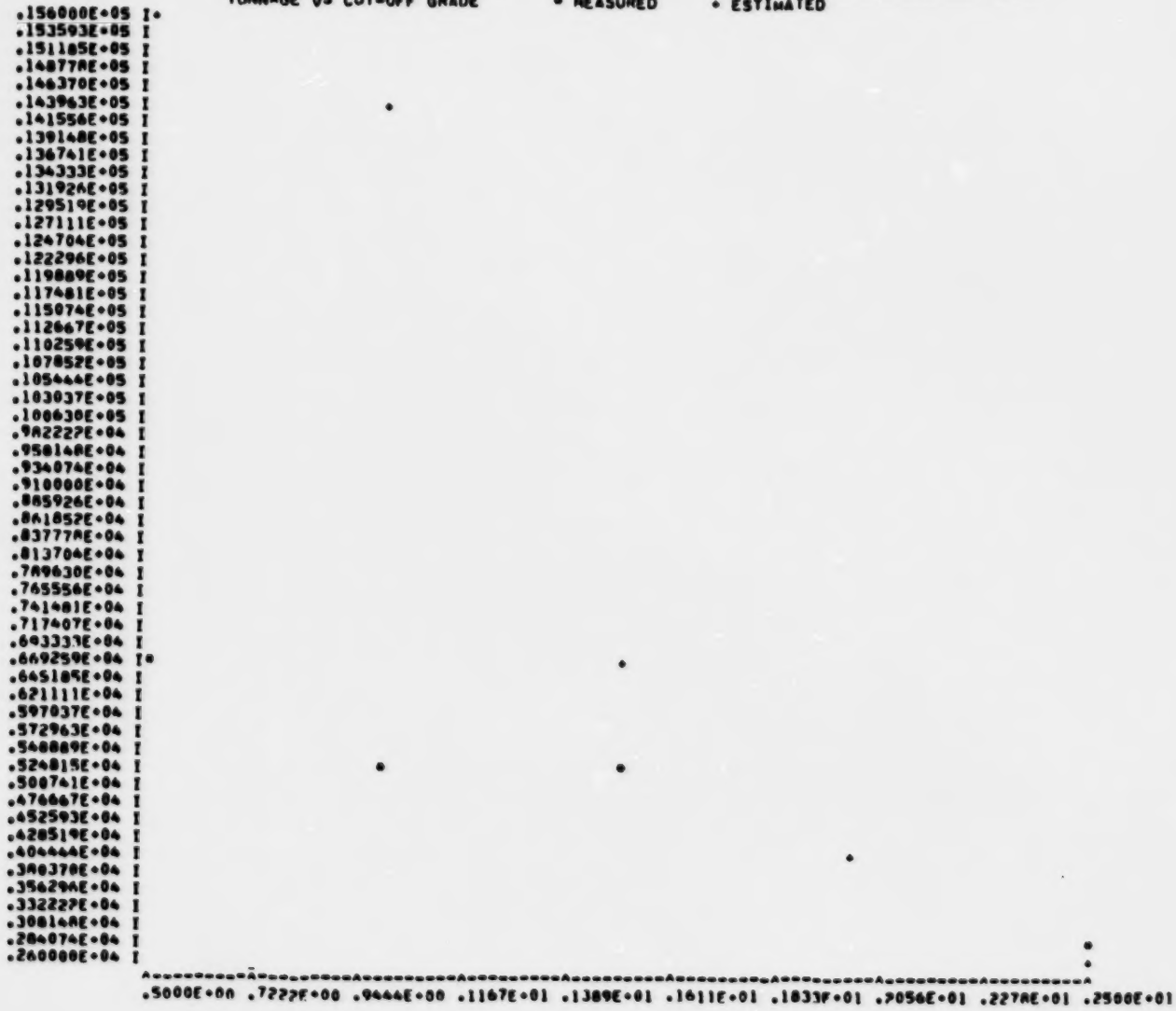
SECTION 6 - - TWO DIMENSIONAL PROJECTION VIEW OF LEVELS PROCESSED

(SOUTH-NORTH SECTION)



SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

TONNAGE vS CUT-OFF GRADE * MEASURED + ESTIMATED

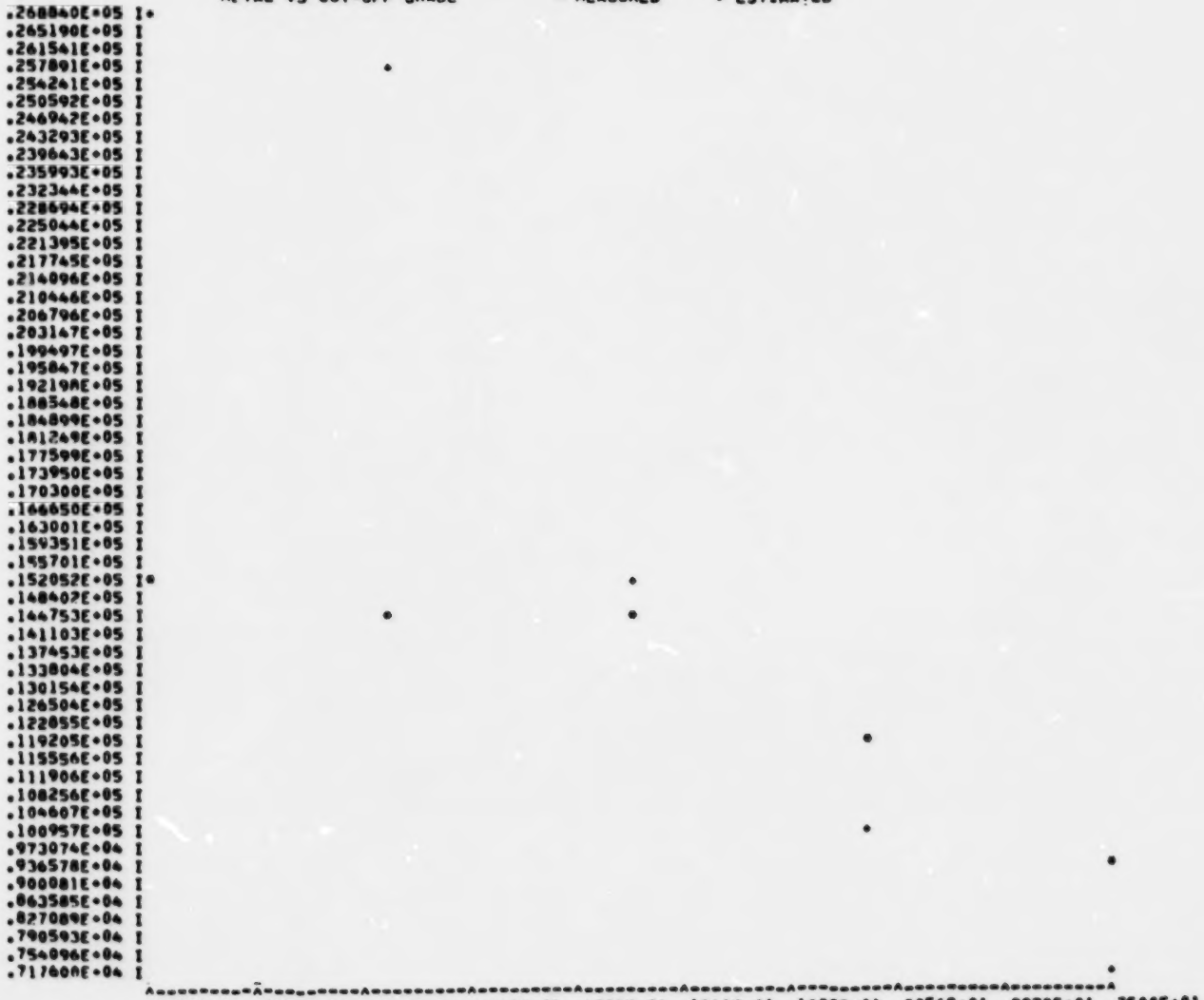


SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

AVERAGE GRADE VS CUT-OFF GRADE * MEASURED + ESTIMATED

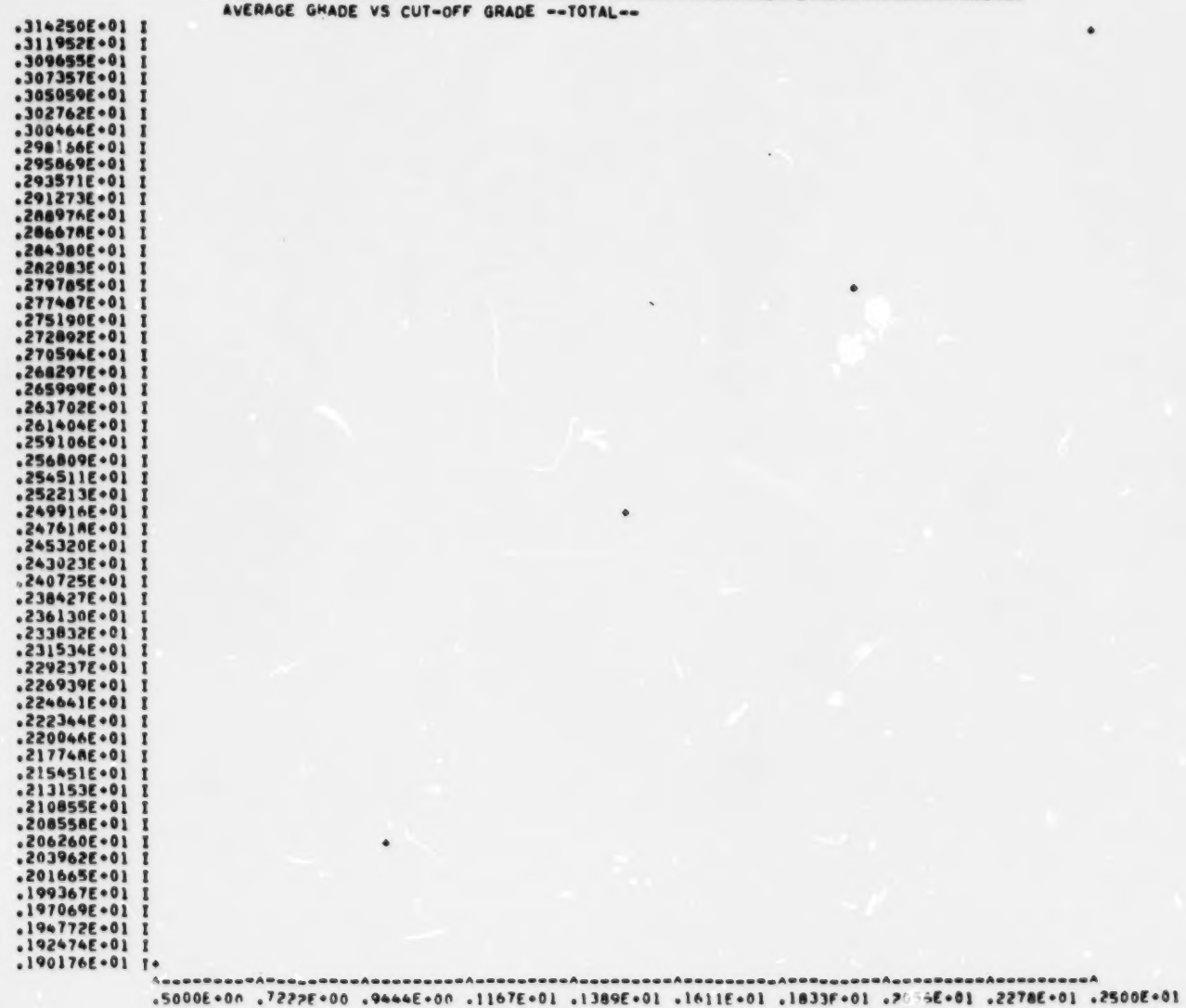
SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

METAL VS CUT-OFF GRADE * MEASURED + ESTIMATED



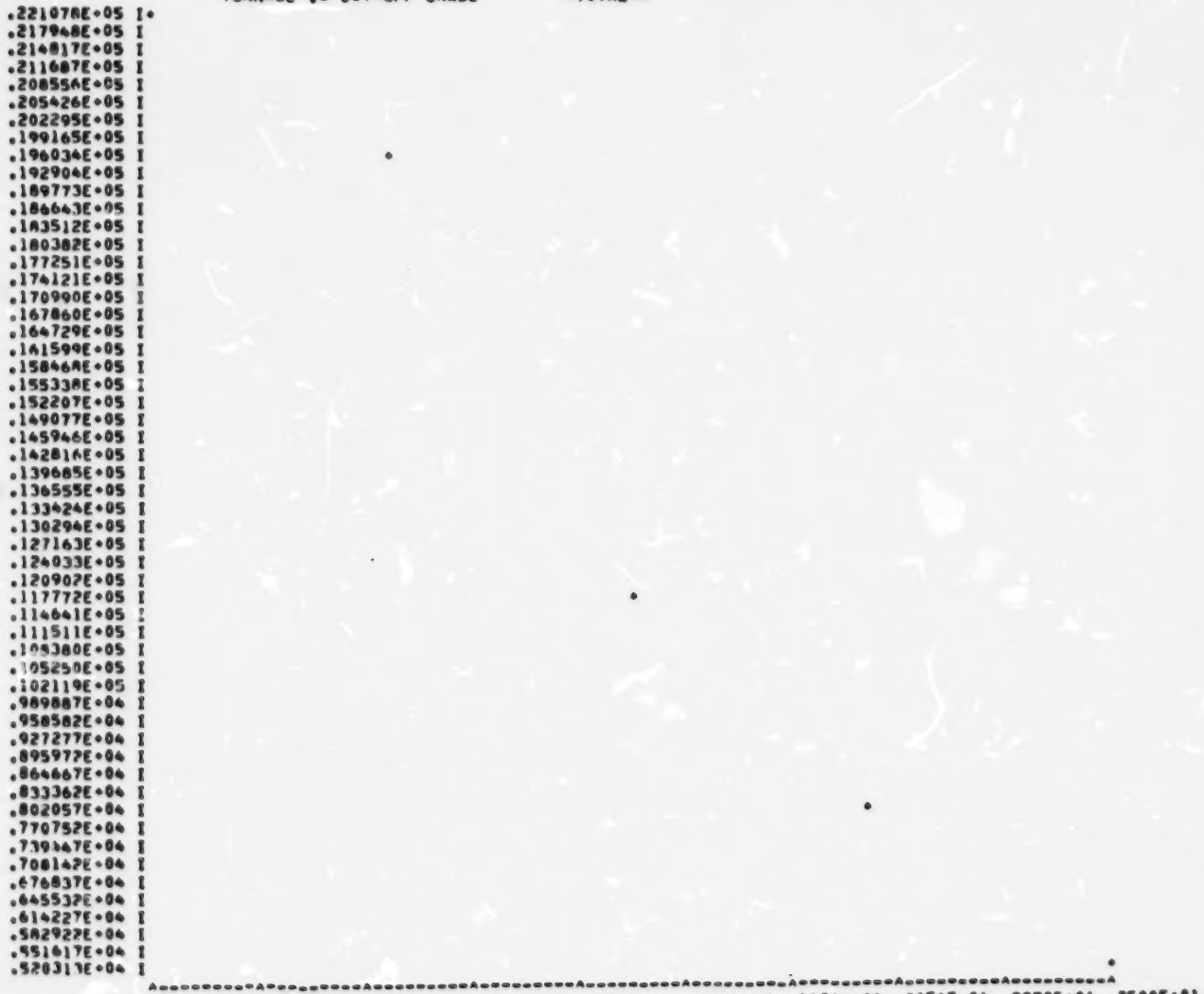
SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

AVERAGE GRADE VS CUT-OFF GRADE --TOTAL--



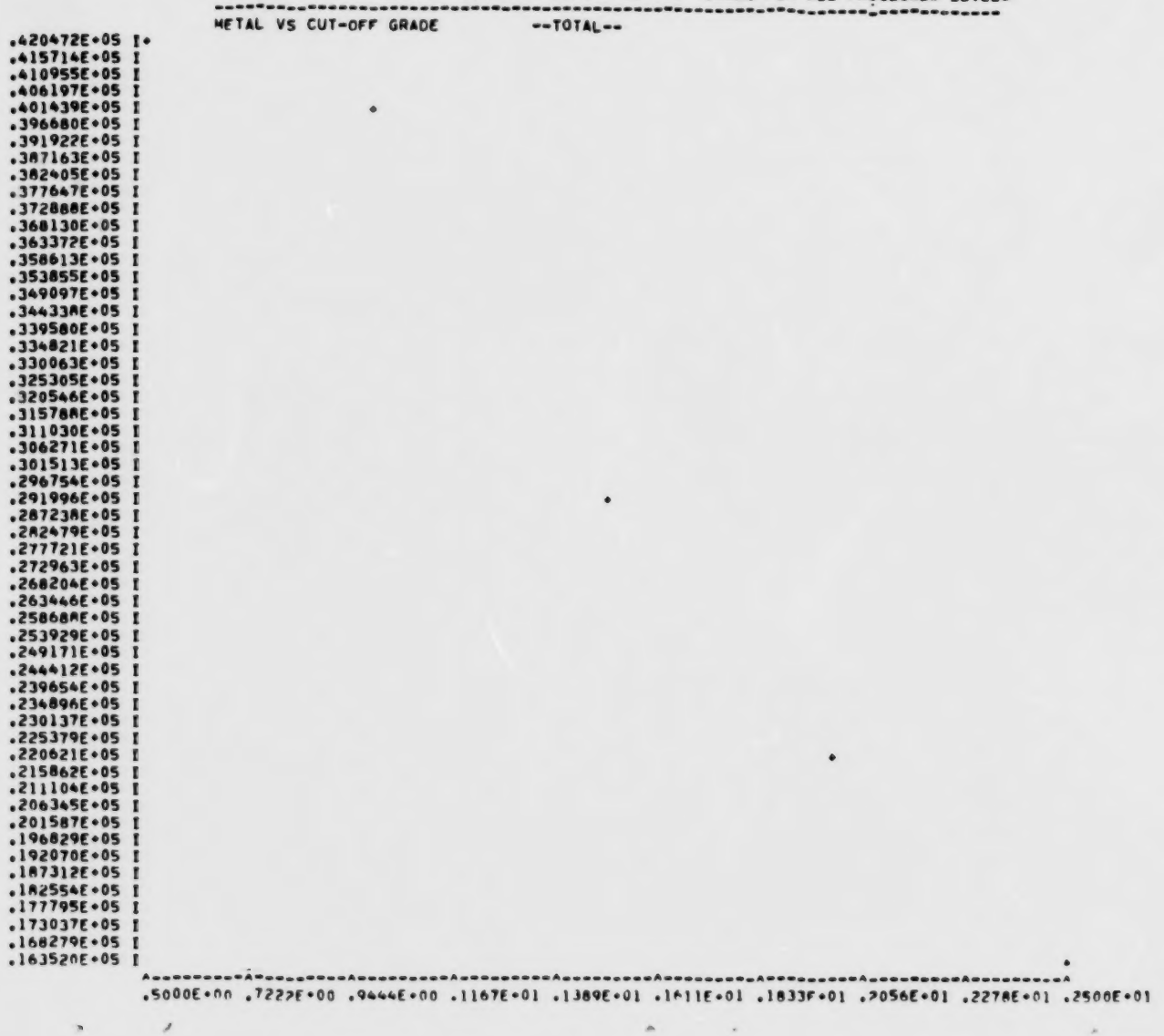
SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

TONNAGE VS CUT-OFF GRADE --TOTAL--



SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

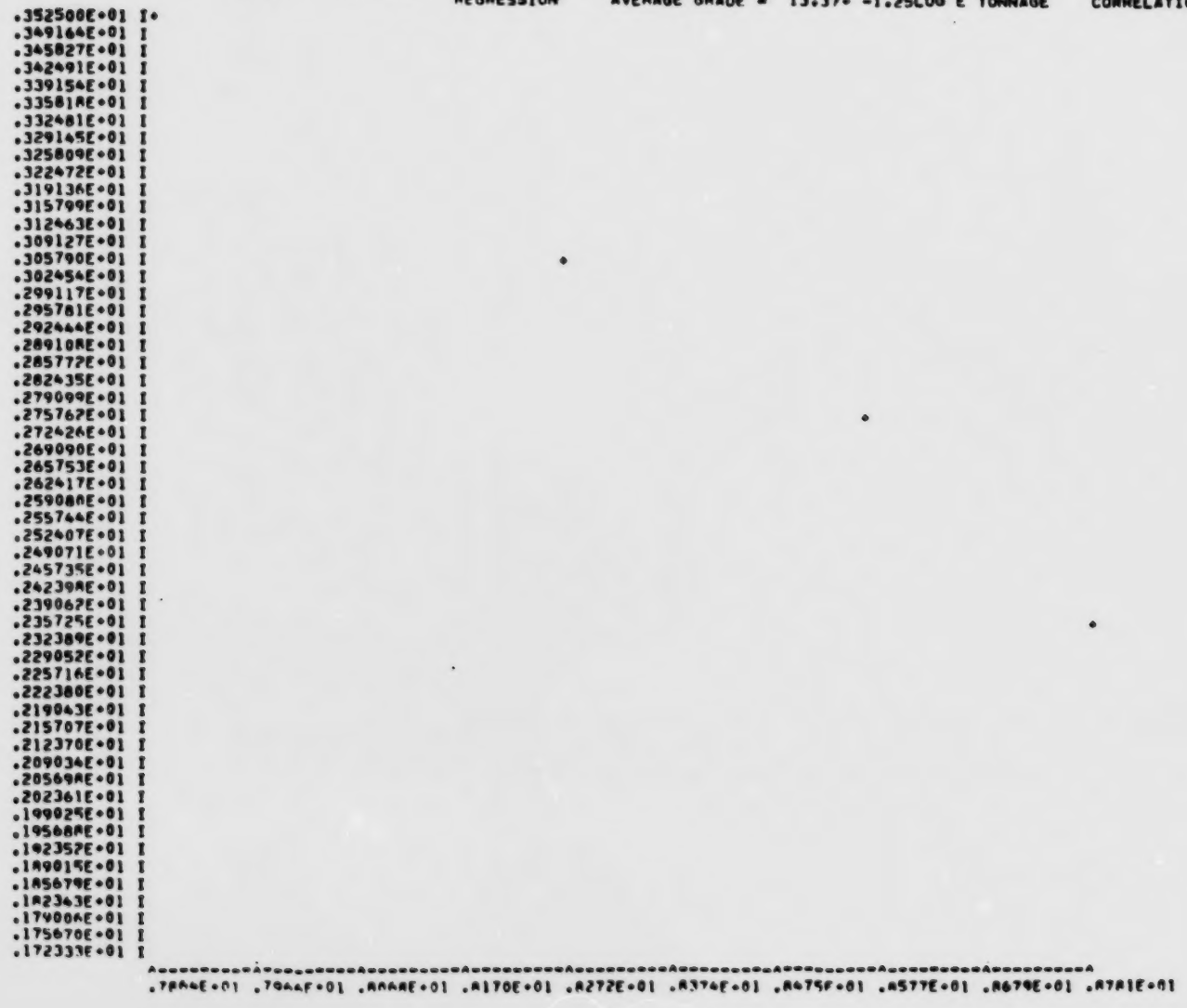
METAL VS CUT-OFF GRADE --TOTAL--



SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

AVERAGE GRADE VS LOG BASE E OF MEASURED TONNAGE

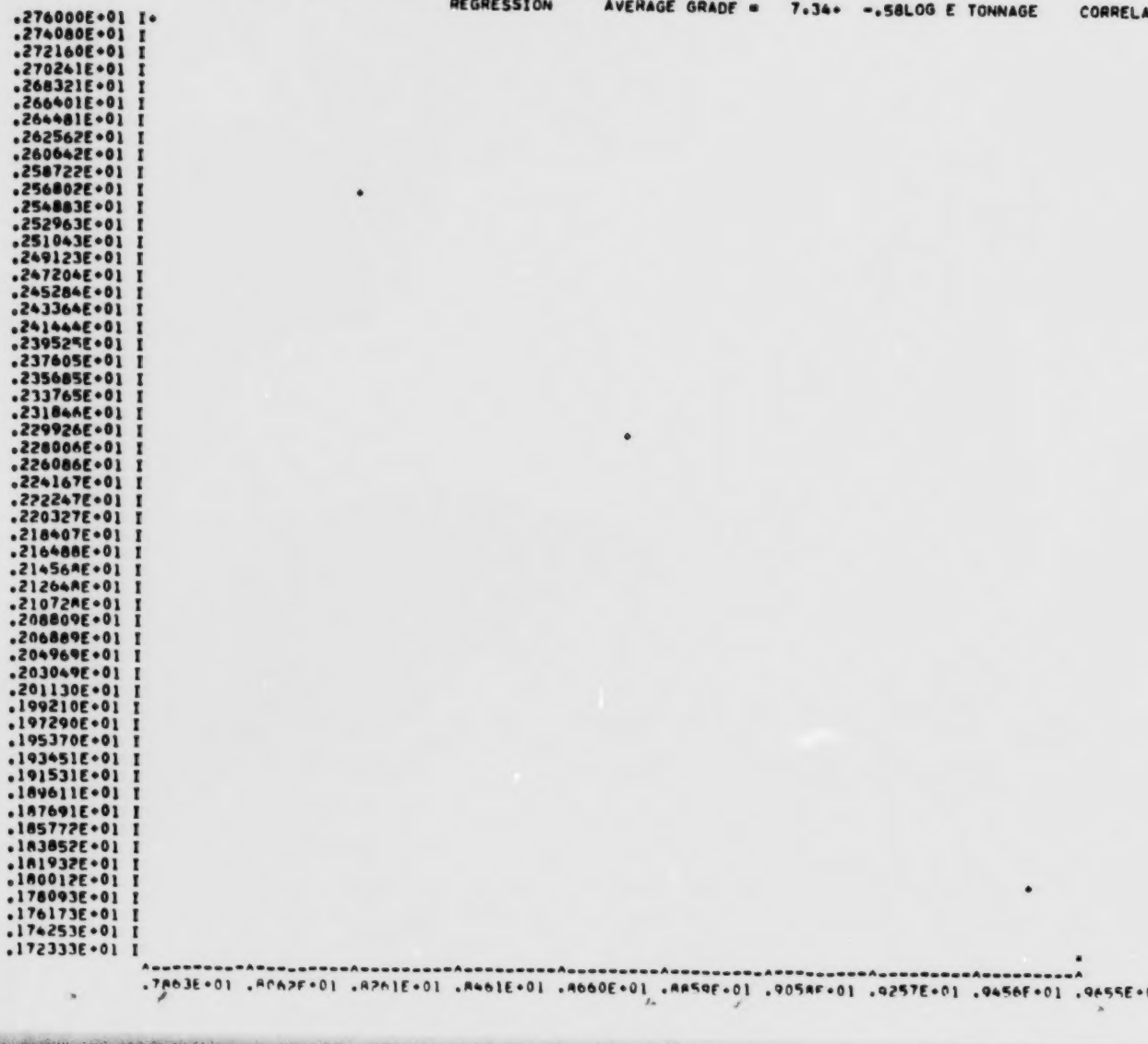
REGRESSION AVERAGE GRADE = 13.37• -1.25LOG E TONNAGE CORRELATION IS -.993



SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

AVERAGE GRADE VS LOG BASE E OF ESTIMATED TONNAGE

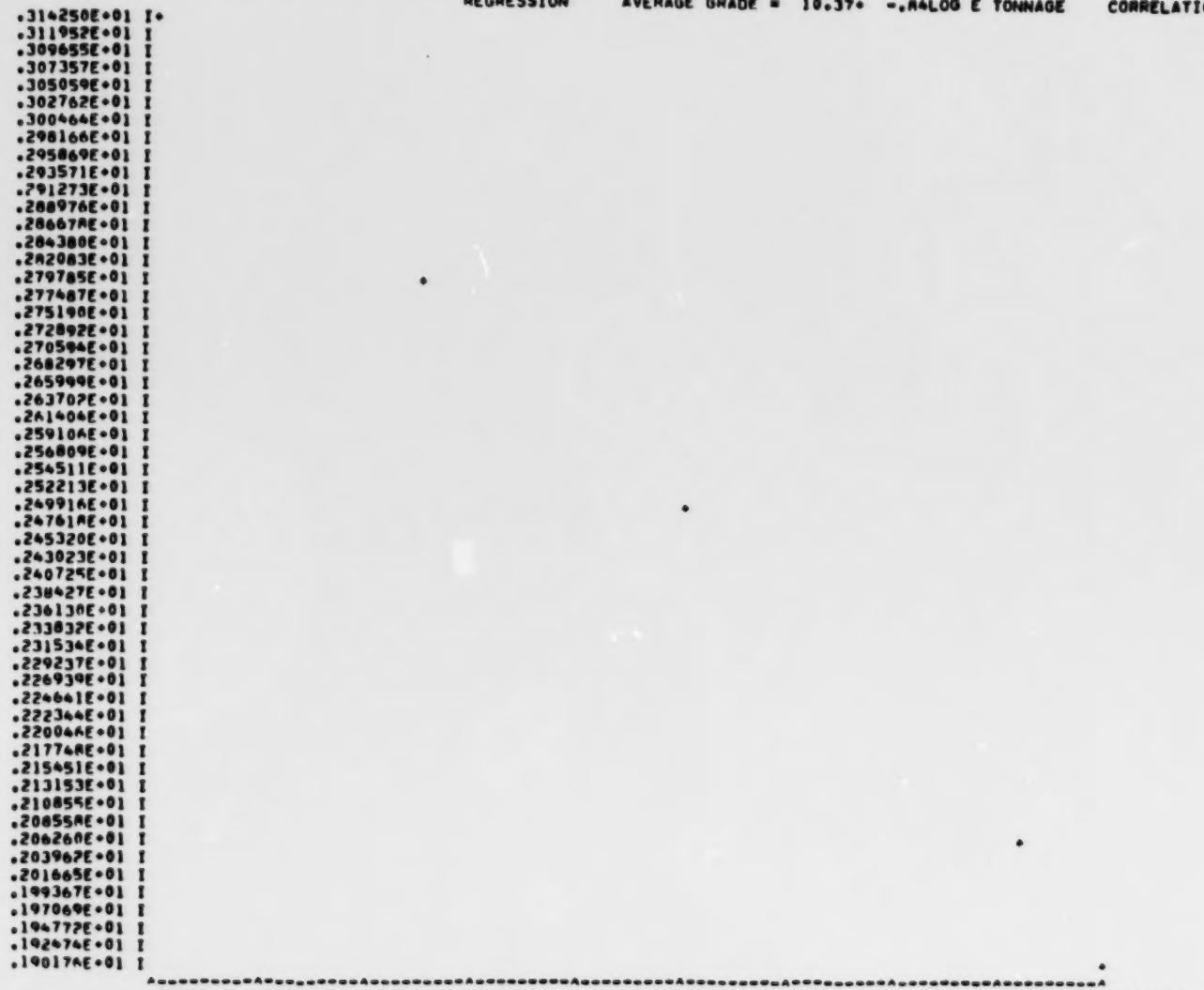
REGRESSION AVERAGE GRADE = 7.34+ -.58LOG E TONNAGE CORRELATION IS -.998



SECTION 7 - - GRAPHS OF MEASURED ESTIMATED AND TOTALS FOR ALL PROCESSED LEVELS

AVERAGE GRADE VS LOG BASE E OF TOTAL TONNAGE

REGRESSION AVERAGE GRADE = 10.37+ -.84LOG E TONNAGE CORRELATION IS -.999



REFERENCES

1. Sabourin, R.L., "Program MEG2050 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-105(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

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Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
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Canada Centre for Mineral and Energy Technology | Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2100 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

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ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

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PROGRAM MEG2100 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2100 is to perform a statistical analysis with each variable read, as well as to the logarithmic value of these variables and optionally to execute a regression analysis between some chosen variables. Histogram and cummulative distribution graphics are provided as well as distribution tests. The users have a choice of several options such as: rejection of outliers, option to read sample numbers, rock codes, zone codes, coordinates and to select samples with specified rock codes.

The main application of this program is to understand the statistical behaviour of each studied variable. The input file of program MEG2100 is provided by MEG 2010, MEG2040 or by the user.

The documentation of this program is technical and subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2100
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2100 est de fournir une analyse statistique de chaque variable lue ainsi que de leur valeur logarithmique et optionnellement d'exécuter une analyse de régression entre certaines variables choisies. MEG2100 fournit des graphiques donnant les histogrammes ainsi que les fréquences cumulées et effectue les tests de distribution. L'utilisateur a le choix parmi plusieurs options telles que: le rejet des valeurs extrêmes; la lecture des numéros d'échantillon, des codes pour le type de roche, des codes pour les zones minéralisées, ainsi que des coordonnées; il a aussi le choix parmi certains types de roche.

L'application principale de ce programme est de mieux comprendre le comportement statistique de chaque variable étudiée. Le fichier d'entrée de MEG2100 est fourni par MEG2010, MEG2040 ou par l'utilisateur.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2100(Z,W,S,SUM,SD,XY,CR,AV,B,T,SEB,NORD,IORD,AWT,K2,
     -                   K3,K5,K6)
C*
C*
C*****************************************************************************
C*                                                                           *
C******GENERAL DESCRIPTION                                                   *
C*                                                                           *
C*     THIS PROGRAM BASICALLY APPLIES A STATISTICAL ANALYSIS TO EACH         *
C*     VARIABLE READ, AS WELL AS TO THE VARIABLE'S LOGARITHMIC               *
C*     VALUES, AND OPTIONALLY PROVIDES REGRESSION ANALYSES BETWEEN           *
C*     SELECTED VARIABLES;                                                   *
C*     STATISTICAL ANALYSIS CONSISTS OF                                      *
C*       - A COMPLETE SET OF CALCULATED STATISTICAL VALUES (SEE              *
C*         CALCULATED STATISTICS);                                           *
C*       - A HISTOGRAM AND CUMULATIVE FREQUENCY PLOT;                        *
C*       - AN ANALYSIS OF THE DISTRIBUTION'S NORMAL (BELL CURVE) FIT         *
C*         USING THE CHI-SQUARE AND KOLMOGOROV-SMIRNOV TESTS;                *
C*     STATISTICAL ANALYSIS IS AUTOMATICALLY REPEATED FOR THE                *
C*     LOGARITHMIC VALUES OF EACH VARIABLE;                                  *
C*     REGRESSION ANALYSIS CONSISTS OF                                       *
C*       - A LIST OF REGRESSION PARAMETERS AND STATISTICS;                   *
C*       - A GRAPHICAL REPRESENTATION OF EXPERIMENTAL VALUES;                *
C*     THIS PROGRAM CONSISTS OF SEVEN SUBROUTINES AND CALLS                  *
C*     SUBROUTINES CONTAINED IN IMSLIB LIBRARY PACKAGE AS WELL AS SORT/      *
C*     MERGE LIBRARY PACKAGE; THIS PROGRAM HAS BEEN WRITTEN IN FORTRAN       *
C*     4.8 USING A CDC CYBER COMPUTER AND WAS ORIGINALLY CREATED BY          *
C*     RAYMOND SABOURIN (EMR,CANMET,MRL) , MAY 1982.                         *
C*     N.B. THIS PROGRAM USES SUBROUTINES FROM I.M.S. LIBRARY (MDNOR,        *
C*          GFIT, ...).                                                      *
C*                                                                           *
C*****************************************************************************
C*                                                                           *
C*                                                                           *
C*********,*******************************************************************
C*                                                                           *
C*                                                                           *
C******OPTIONS READ ON INPUT                                                 *
C*                                                                           *
C*     CARD 1 - N11,IREJ,NCHOIX,MST,NOUT,NFOR,NSR,NSO,NC,NCTE,NBORN,         *
C*              IN,NRC                                                       *
C*              FORMAT READ IS (16I5)                                        *
C*          N11    - TOTAL NUMBER OF VARIABLES TO BE ANALYZED; N11.LE.10     *
C*          IREJ   - WHEN IREJ=1, EACH VARIABLE VALUE THAT IS GREATER        *
C*                   THAN ITS MEAN PLUS THREE STANDARD DEVIATIONS IS         *
C*                   REJECTED WHEN THE STATISTICS FOR A VARIABLE IS          *
C*                   CALCULATED; A NEW SET OF STATISTICS WILL BE             *
C*                   CALCULATED USING THE UNREJECTED VALUES; THE             *
C*                   UNREJECTED VALUES WILL ALSO BE USED TO DRAW             *
C*                   HISTOGRAMS AND TO COMPUTE DISTRIBUTION TEST;            *
C*                   WHEN IREJ=0, THIS OPTION DOES NOT APPLY;                *
C*          NCHOIX - OPTION WHICH DETERMINES A SELECTING SEQUENCE OF         *
C*                   OBSERVATIONS WHEN THESE ARE NOT ALL WANTED;             *
C*                   IF NCHOIX=0, OPTION IS NOT APPLIED (I.E. ALL            *
C*                   OBSERVATIONS ARE USED);                                 *
C*                   IF NCHOIX.GT.0, THE FIRST OBSERVATION AND EVERY         *
C*                   SUCCESSIVE NCHOIX OBSERVATIONS ARE USED;                *
```

```
C*                E.G. IF NCHOIX=3, EVERY THIRD OBSERVATION IS          *
C*                SELECTED;                                             *
C*                IF NCHOIX.LT.0, THESE SAME OBSERVATIONS ARE THE       *
C*                ONLY ONES LEFT OUT;                                   *
C*                E.G. IF NCHOIX=-3, EVERY THIRD OBSERVATION IS NOT     *
C*                SELECTED;                                             *
C*      MST     - DETERMINES THE GREATEST NUMBER OF HISTOGRAM          *
C*                CLASSES TO BE USED;                                   *
C*                THIS NUMBER DOES NOT EXCEED 4*MST+2;                  *
C*                A CLASS IS EQUIVALENT TO ONE STANDARD DEVIATION       *
C*                DIVIDED BY MST.                                       *
C*                THE FIRST (LAST) CLASS INCLUDES ALL VALUES            *
C*                SMALLER (GREATER) THAN THE INFERIOR (SUPERIOR)        *
C*                LIMIT OF THE SECOND (SECOND LAST) CLASS.  EACH        *
C*                CLASS MUST CONTAIN ABOUT FIVE VALUES;                 *
C*      NOUT    - PRINTING OPTION;                                     *
C*                IF NOUT=1, OBSERVATIONS ARE PRINTED BEFORE            *
C*                STATISTICAL ANALYSIS;                                 *
C*                IF NOUT=2, OBSERVATIONS USED FOR REGRESSION ARE       *
C*                PRINTED AT EACH REGRESSION;                           *
C*                IF NOUT=3, BOTH OF THE PREVIOUS CHOICES ARE           *
C*                APPLIED SIMULTANEOUSLY;                               *
C*                IF NOUT=0, NO OBSERVATIONS ARE PRINTED;               *
C*      NFOR    - IF NFOR=0, ONLY VARIABLE VALUES AND A REJECTION      *
C*                OPTION WILL BE READ FROM DATA FILE;                   *
C*                IF NFOR=1, SAMPLE COORDINATES AND IDENTIFIERS         *
C*                WILL BE READ AS WELL (I.E. EACH OBSERVATION IS TO     *
C*                BE IDENTIFIED BY AN INTEGER SAMPLE NUMBER);           *
C*                SEE CARD NO. 5 FOR READING STATEMENTS;                *
C*      NSR     - OPTION DETERMINING THE MEANS BY WHICH STATISTICAL    *
C*                ANALYSIS IS TO BE PERFORMED;                          *
C*                IF NSR=0, VALUES FOR EACH VARIABLE THAT ARE           *
C*                OUTSIDE OF THEIR PERMISSIBLE RANGES (RESPECTIVELY)    *
C*                WILL BE EXCLUDED BEFORE APPLYING STATISTICAL          *
C*                ANALYSIS TO THE VARIABLE;                             *
C*                IF NSR.LT.0, STATISTICAL ANALYSIS OF EACH VARIABLE    *
C*                IS PERFORMED AFTER EXCLUDING ALL OBSERVATIONS         *
C*                HAVING AT LEAST ONE VARIABLE VALUE FOUND OUTSIDE      *
C*                OF ITS PERMISSIBLE RANGE;                             *
C*                IF NSR.GT.0, STATISTICAL ANALYSIS IS SKIPPED AND      *
C*                ONLY REGRESSION IS APPLIED;                           *
C*      NSO     - UNUSED WHEN NFOR=0;                                  *
C*                IF NSO.LT.0, -NSO REPRESENTS THE NUMBER OF RANGES     *
C*                OF DRILL HOLE NUMBERS TO BE REJECTED (INCLUSIVELY);   *
C*                IF NSO.GT.0, NSO REPRESENTS THE NUMBER OF RANGES      *
C*                OF DRILL HOLE NUMBERS TO BE KEPT (INCLUSIVELY);       *
C*                THE NUMBER OF RANGES MUST NOT BE GREATER THAN 10;     *
C*                SEE CARD 8                                            *
C*      NC      - UNUSED WHEN NFOR=0 BECAUSE COORDINATES ARE NOT       *
C*                READ;                                                 *
C*                NC REPRESENTS THE NUMBER OF RECTANGULAR REGIONS       *
C*                TO BE STUDIED; WHEN NC=0, NO PARTICULAR REGION IS     *
C*                CHOSEN ; N.B. NC.LE.10; (SEE CARD 6)                  *
C*      NCTE    - DISPLACEMENT OPTION; IF NCTE.NE.0 A CONSTANT (TO     *
C*                BE SPECIFIED ON CARD 7) IS ADDED TO EACH VARIABLE;    *
C*      NBORN   - IF NBORN=0, ALL STRICTLY POSITIVE VARIABLE VALUES    *
C*                ARE ACCEPTED;                                         *
```

```
C*                    IF NBORN=1, PERMISSIBLE RANGES FOR EACH VARIABLE
C*                    WILL BE READ IN FROM CARD 3;
C*          IN      - WHEN UNSPECIFIED, TAPE8 (PFNI) PERMANENT FILE IS
C*                    USED AS A DATA FILE;
C*                    IF IN.GT.0, OBSERVATIONS ARE READ FROM INPUT CARDS
C*                    AFTER CARD 5;
C*          NRC     - UNUSED WHEN NFOR=0;
C*                    NRC IS THE NUMBER OF ROCK CODES (IRC) TO BE KEPT
C*                    FOR ANALYSIS (SEE CARD 9);
C*                    IF NRC=0, ALL CODES ARE USED;
C*                    NRC.LE.10;
C*
C*      CARD 2 - INV(I),I=1,N11
C*               FORMAT READ IS (10I5);
C*           INV    - ARRAY CONTAINING INVERSE OPTIONS ASSOCIATED WITH
C*                    EACH VARIABLE READ IN RESPECTIVELY;
C*                    IF INV(I).GT.0, THE INVERSE OF THE I-TH VARIABLE
C*                    WILL BE TREATED INSTEAD OF THE VARIABLE ITSELF;
C*                    IN THIS CASE, THE I-TH VARIABLE'S INVERSE WILL BE
C*                    STORED IN PLACE OF THE VARIABLE ITSELF.  ALL
C*                    VARIABLE TRANSFORMATIONS (I.E. ADDING OF A
C*                    CONSTANT, USE OF LOGARITHMS AND EXPONENTS) WILL
C*                    THUS BE APPLIED TO THE INVERSE.
C*                    IF INV(I)=0, THE I-TH VARIABLE IS USED WITHOUT
C*                    CHANGE;
C*
C*      CARD 3 - (BINF(I),BSUP(I),I=1,N11)
C*               FORMAT READ IS (8F10.0)
C*               CARD IS NOT READ IF NBORN=0;
C*           BINF   - ARRAY CONTAINING THE SMALLEST ACCEPTABLE VALUES
C*                    (REJECTED) FOR EACH RESPECTIVE VARIABLE READ IN;
C*           BSUP   - ARRAY CONTAINING THE GREATEST ACCEPTABLE VALUES
C*                    (REJECTED) FOR EACH RESPECTIVE VARIABLE READ IN;
C*
C*      CARD 4 - TITLE(I),I=1,8
C*               FORMAT READ IS (8A10);
C*           TITLE  - TITLE-HEADING FOR EXECUTION IDENTIFICATION;
C*
C*      CARD 5 - FTN(I),I=1,8
C*               FORMAT READ IS (8A10);
C*           FTN    - FORMAT TO BE USED FOR READING DATA FROM EITHER
C*                    INPUT CARDS OR TAPE 8 (SEE OPTION ('N'-CARD 1));
C*
C*                    TWO POSSIBLE READING STATEMENTS ARE AVAILABLE,
C*                    ACCORDING TO THE VALUE OF NFOR.
C*                    IF NFOR=0 READING STATEMENT IS;
C*                    READ(8,FTN) (X(I),I=1,N11),IR
C*                    IF NFOR=1, READING STATEMENT IS;
C*                    READ(8,FTN) NS,IS,IRC,CX,CY,CZ,(X(I),I=1,N11),IR
C*                    (SEE VARIABLES USED BELOW)
C*
C*      DATA CARDS
C*      ---- -----
C*               IF IN.GT.0, THE NEXT CARDS CONTAIN SAMPLING DATA;
C*
C*      CARD 6 - CXRI(I),CXRS(I),CYRI(I),CYRS(I),CZRI(I),CZRS(I),
C*               I=1,NC;
```

```
C*              FORMAT READ IS (6F10.0)                                 *
C*              CARD IS NOT READ IF NC=0 OR NFOR=0;                     *
C*              VALUES READ ARE USED TO DEFINE NC COORDINATE REGIONS;   *
C*         CXRI,CYRI,CZRI - LOWER LIMITS OF ACCEPTABLE OBSERVATION      *
C*                  COORDINATES ALONG THE THREE RESPECTIVE AXES         *
C*                  (LIMITS ARE KEPT);                                 *
C*         CXRS,CYRS,CZRS - UPPER LIMITS OF ACCEPTABLE OBSERVATION      *
C*                  COORDINATES ALONG THE THREE RESPECTIVE AXES         *
C*                  (LIMITS ARE KEPT);                                 *
C*                                                                     *
C*     CARD 7 - CTE(I),I=1,N11                                         *
C*              FORMAT READ IS (8F10.0)                                *
C*              CARD IS NOT READ IF NCTE.EQ.0;                         *
C*         CTE    - ARRAY CONTAINING THE RESPECTIVE VALUES TO BE ADDED *
C*                  TO EACH VARIABLE;                                  *
C*                                                                     *
C*     CARD 8 - NSON(I),I=1,IABS(NSO)*2                                *
C*              FORMAT READ IS (16I5);                                 *
C*              CARD IS NOT READ IF NSO=0 OR NFOR=0;                   *
C*         NSON   - ARRAY CONTAINING PAIRS OF MEG SAMPLE NUMBERS (NS)  *
C*                  TO BE REJECTED OR KEPT ACCORDING TO NSO; UNEVEN    *
C*                  INDICES CORRESPOND TO THE BEGINNING OF EACH RANGE, *
C*                  WHEREAS THE EVEN INDICES CORRESPOND TO THE END OF  *
C*                  EACH RANGE;                                        *
C*                  IF NSO.LT.0, RANGES ARE REJECTED (INCLUDING RANGE  *
C*                  LIMITS);                                           *
C*                  IF NSO.GT.0, RANGES ARE KEPT (INCLUDING RANGE      *
C*                  LIMITS);                                           *
C*                                                                     *
C*     CARD 9 - NR,(NTYRC(I),I=1,NRC)                                  *
C*              FORMAT READ IS (I5,5X,10R(NR));                        *
C*              CARD IS NOT READ IF NRC=0 OR NFOR=0;                   *
C*         NR     - NUMBER OF CHARACTERS FOUND IN ROCK CODES;          *
C*                  THIS VALUE MUST COINCIDE WITH READING FORMAT;      *
C*                  DEFAULT VALUE IS TWO;                              *
C*                  NR.LE.9;                                           *
C*         NTYRC  - ARRAY CONTAINING CHARACTER ROCK CODES TO BE KEPT    *
C*                  FOR ANALYSIS; ROCK CODES MUST CONTAIN NR           *
C*                  CHARACTERS EACH;                                   *
C*                                                                     *
C*     REGRESSION CARDS                                                *
C*     ----------- -----                                               *
C*              THE FOLLOWING THREE CARDS ARE REPEATED FOR EACH        *
C*              REGRESSION APPLIED;                                    *
C*                                                                     *
C*    CARD 10 - NOINDW,NOIND,(NV(I),NL(I),ND(I),I=1,10),L,LOG2         *
C*              FORMAT READ IS (2I5,10(I2,A1,I2),I2,A1);               *
C*         NOINDW - NUMBER OF INDEPENDANT VARIABLES TO BE EVENLY       *
C*                  WEIGHTED (NOINDW.LE.3);                            *
C*         NOIND  - NUMBER OF INDEPENDANT VARIABLES TO BE USED FOR     *
C*                  REGRESSION; NOIND VALUES INCLUDED IN THE ARRAYS    *
C*                  NV, NL, AND ND WILL BE USED TO DEFINE THE DIF-     *
C*                  FERENT INDEPENDANT VARIABLES;                      *
C*                  NOIND.LE.10;                                       *
C*         NV     - ARRAY CONTAINING INDICES OF RESPECTIVE INDEPENDANT *
C*                  VARIABLES (ACCORDING TO THE ORDER IN WHICH VARI-   *
C*                  ABLES ARE READ IN);                                *
```

```
C*          NL      - ARRAY CONTAINING LOGARITHMIC OPTIONS (NL=1HL)          *
C*                    FOR RESPECTIVE INDEPENDANT VARIABLES;                  *
C*          ND      - ARRAY CONTAINING EXPONENTS TO BE APPLIED TO EACH       *
C*                    RESPECTIVE INDEPENDANT VARIABLE;                       *
C*          L       - INDEX OF DEPENDANT VARIABLE (ACCORDING TO THE          *
C*                    ORDER BY WHICH IT IS READ IN);                         *
C*          LOG2    - OPTION PERMITTING USE OF THE LOGARITHM OF              *
C*                    THE L-TH VARIABLE AS DEPENDANT VARIABLE                *
C*                    (LOG2=1HL);                                            *
C*                                                                           *
C*      CARD 11 - VMIN(I),VMAX(I),MV1(I),MV2(I),I=1,NOINDW                   *
C*                FORMAT READ IS (2F10.3,2I5);                               *
C*               CARD IS NOT READ IF NOINDW=0;                               *
C*                  VMIN;  ARRAY CONTAINING THE LOWER BOUNDS OF THE          *
C*                         INTERVAL TO BE EVENLY DISTRIBUTED;                *
C*                  VMAX;  ARRAY CONTAINING THE UPPER BOUNDS OF THE          *
C*                         INTERVAL TO BE EVENLY DISTRIBUTED;                *
C*                   MV1;  ARRAY CONTAINING THE NUMBER OF CLASSES            *
C*                         FOR PARTITIONING THE INDICATED INTERVAL;          *
C*                   MV2;  ARRAY CONTAINING THE INDICES OF PARTITIONNED      *
C*                         VARIABLES;                                        *
C*                                                                           *
C*      CARD 12 - TITLE(I),I=1,8                                             *
C*                FORMAT READ IS (8A10)                                      *
C*          TITLE  - TITLE HEADING FOR REGRESSION SECTION;                   *
C*                                                                           *
C***************************************************************************
C*                                                                           *
C*                                                                           *
C***************************************************************************
C*                                                                           *
C******OUTPUT DISPOSITION                                                   *
C*                                                                           *
C*      SECTION 1 - OPTIONS APPLIED FOR STATISTICS ARE PRINTED;              *
C*      SECTION 2 - OBSERVATIONS KEPT FROM TAPE 8 (OR INPUT) ARE             *
C*                  PRINTED ON OUTPUT IN ORIGINAL FORMAT IF NOUT=1 OR        *
C*                  3;                                                       *
C*      SECTION 3 - SORTED VALUES OF STUDIED VARIABLE ARE PRINTED ON         *
C*                  OUTPUT;                                                  *
C*      SECTION 4 - STATISTICS ASSOCIATED WITH THE STUDIED VARIABLE ARE      *
C*                  PRINTED;                                                 *
C*      SECTION 5 - HISTOGRAM AND CUMULATIVE FREQUENCY DIAGRAM OF THE        *
C*                  STUDIED VARIABLE ARE PRINTED;                            *
C*      SECTION 6 - TABLE OF CUMULATIVE FREQUENCY VALUES IS PRINTED,         *
C*                  FOLLOWED BY A GRAPHICAL REPRESENTATION OF                *
C*                  CUMULATIVE FREQUENCY;                                    *
C*      SECTION 7 - STATISTICAL TESTS ARE APPLIED TO THE ANALYZED            *
C*                  VARIABLE;                                                *
C*      SECTION 8 - OPTIONS APPLIED FOR REGRESSION OF THE STUDIED CASE       *
C*                  ARE PRINTED;                                             *
C*      SECTION 9 - STATISTICS ASSOCIATED WITH STUDIED REGRESSION CASE       *
C*                  ARE PRINTED;                                             *
C*      SECTION 10 - LIST OF INFORMATION FOR STUDIED REGRESSION CASE         *
C*                   IS PRINTED;                                             *
C*      SECTION 11 - GRAPHIC OF EXPERIMENTAL VALUES OF DEPENDANT             *
C*                   VARIABLE VERSUS FIRST INDEPENDANT VARIABLE, FOR         *
C*                   THE STUDIED REGRESSION CASE, IS PRINTED;                *
```

```
C*                                                                      *
C************************************************************************
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******DESCRIPTION OF PARAMETERS                                        *
C*                                                                      *
C*      Z       - ARRAY CONTAINING THE OBSERVATIONS TO BE STUDIED;      *
C*      W       - ARRAY CONTAINING ALL THE VARIABLE VALUES ASSOCIATED   *
C*                WITH A SINGLE OBSERVATION;                            *
C*      S       - ARRAY OF CORRELATION COEFFICIENTS;                    *
C*      SUM     - ARRAY OF ARITHMETIC MEAN FOR EACH VARIABLE;           *
C*      SD      - ARRAY OF STANDARD DEVIATION FOR EACH VARIABLE;        *
C*      XY      - ARRAY CONTAINING VARIABLE VALUES ASSOCIATED WITH A    *
C*                SINGLE OBSERVATION;                                   *
C*      CR      - VARIANCE OF INDEPENDANT VARIABLE;                     *
C*      AV      - PERCENTAGE OF VARIATION FOR VARIABLE;                 *
C*      B       - NUMERATOR IN CALCULATION OF T-TEST;                   *
C*      T       - VALUE FOR STUDENT'S T-TEST;                           *
C*      SEB     - DENOMINATOR IN CALCULATION OF T-TEST;                 *
C*      NORD    - INDEPENDANT VARIABLE INDICE;                          *
C*      IORD    - INDEPENDANT VARIABLE INDICE;                          *
C*      AWT     - WEIGHT OF OBSERVATION;                                *
C*                                                                      *
C************************************************************************
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******VARIABLES USED IN FORMAT FTN                                     *
C*                                                                      *
C*      X       - ARRAY CONTAINING ALL THE VARIABLE VALUES ASSOCIATED   *
C*                WITH A SINGLE OBSERVATION,THE UNEVEN INDICES REPRESENT*
C*                THE VALUES READ, WHEREAS THE EVEN INDICES CONTAIN THE  *
C*                NATURAL LOGARITHMS OF THE PRECEDING VARIABLE (REAL);  *
C*      IR      - REJECTION INDICATOR FOR SAMPLE READ IN (INTEGER);     *
C*                IF IR=0, OBSERVATION IS NOT REJECTED;                 *
C*                IF IR.NE.0, OBSERVATION IS IMMEDIATELY REJECTED;      *
C*      NS      - MEG SAMPLE NUMBER (DRILL HOLE NUMBER, I4);            *
C*      IS      - COMPANY SAMPLE NUMBER (R6);                           *
C*      IRC     - SAMPLE ROCK CODE (R6);                                *
C*      CX      - DEPARTURE OR X-COORDINATE OF SAMPLE (REAL);           *
C*      CY      - LATITUDE OR Y-COORDINATE OF SAMPLE (REAL);            *
C*      CZ      - ELEVATION OR Z-COORDINATE OF SAMPLE (REAL);           *
C*                                                                      *
C************************************************************************
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******VARIABLE DIMENSIONS                                              *
C*                                                                      *
C*      K2 - NUMBER OF SAMPLES;                                         *
C*      K3 - GREATEST NUMBER OF INDEPENDANT VARIABLES (NOIND) TO BE     *
C*           USED IN EACH REGRESSION;                                   *
C*           IF REGRESSION IS NOT APPLIED K3=1;                         *
```

```
C*      K5 - K5=K3+1 ;                                                  *
C*      K6 - NUMBER OF CLASSES OF DATA TO BE EVENLY WEIGHTED PLUS ONE;  *
C*           IF NOINDW=0 THEN K6=1;                                     *
C*                                                                      *
C**********************************************************************
C*                                                                      *
C*                                                                      *
C**********************************************************************
C*                                                                      *
C******DISKFILES USED                                                  *
C*                                                                      *
C*      TAPE1 - INPUT DATA CARDS;                                       *
C*      TAPE6 - OUTPUT LISTING (SEE OUTPUT DISPOSITION);                *
C*      TAPE7 - STORAGE OF SCATTERGRAM DATA (UNCODED);                  *
C*      TAPE8 - ORIGINAL DATA FILE (PFNI), (PERMANENT FILE OF MEG2010,  *
C*                                          OR ANY USERS FILE)          *
C*      TAPE9 - STORAGE OF ACCEPTABLE DATA (UNCODED);                   *
C*      TAPE10 - STORAGE OF UNSORTED INDEXED DATA;                      *
C*      TAPE11 - STORAGE OF SORTED DATA;                                *
C*                                                                      *
C**********************************************************************
C*
C*
C**********************************************************************
C*                                                                      *
C******EXECUTION                                                       *
C*                                                                      *
C*      ACCOUNT,*****.                                                  *
C*      H2100,CM110000,T50,IO300,P2.                                    *
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.                 *
C*      BEGIN,CADD,PROCD,PROGRAMIN=MEG2100.                             *
C*      Q2 = NUMBER OF SAMPLES                                          *
C*      Q3 = NUMBER OF INDEPENDANT VARIABLES, IF WE USE THE REGRESSION  *
C*           OTHERWISE Q3 = 1                                           *
C*      Q5 = Q3 + 1                                                     *
C*      Q6 = NUMBER OF CLASSES OF DATA TO BE EVENLY WEIGHTED PLUS ONE   *
C*      PFNI IS OPTIONAL (SEE OPTION).                                  *
C*                                                                      *
C**********************************************************************
C*
C*
C**********************************************************************
C*                                                                      *
C******DECLARATION OF VARIABLES                                        *
C*                                                                      *
C**********************************************************************
C*                                                                      *
C*                                                                      *
      REAL FTN(8),X1(10),AWT(K6),VMIN(3),VMAX(3),VINC(3)
      REAL Z(K2),W(K2),X(20),BINF(20),BSUP(20),
     -     S(K5,K5),SUM(K5),SD(K5),XY(K5),CR(K5),AV(K3),B(K3),T(K3),
     -          SE8(K3),Y(1)
      REAL FTN2(8)
      REAL FTN3(8)
      INTEGER NV(10),NL(10),ND(10),IV(3),MV1(3),MV2(3),INV(20)
      INTEGER TITLE(8),NN(20),NSON(20)
      INTEGER PA,ZZ
```

CHAPTER 2.0
BLANK OPTION CARD SHEET(S)

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 5
NAME _____

CARD NO. 1

N11	IREJ	NCHOIX	MST	NOUT	NFOR	NSR	NSO	NC	NCTE
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50

NBORN	IN	NRC
51 — 55	56 — 60	61 — 65

FORMAT(13I5)

CARD NO. 2

(INV(I),I=1,N11) FORMAT(10I5)

1 — 5 6 — 10 11 — 15 16 — 20 21 — 25 26 — 30 31 — 35 36 — 40 41 — 45 46 — 50

CARD NO. 3

(BINF(I),BSUP(I),I=1,N11) FORMAT(8F10.0)

1 — 10 11 — 20 21 — 30 31 — 40 41 — 50 51 — 60 61 — 70 71 — 80

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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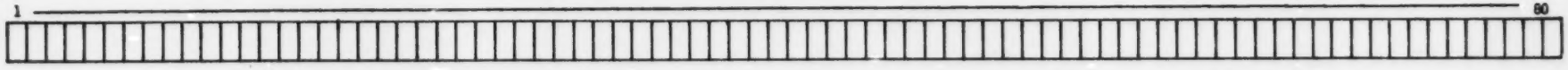
CARD NO. 4

(TITLE(I),I=1,8) FORMAT(8A10)



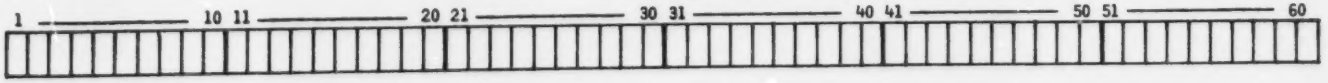
CARD NO. 5

(FTN(I),I=1,8) FORMAT(8A10)

INPUT DATA CARDS FOLLOWS IF IN. GT. 0

CARD NO. 6

(CXRI(I),CXRS(I),CYRI(I),CYRS(I),(CZRI(I),CZRS(I),I=1,NC) FORMAT(6F10.0)



MEG2100 - OPTION CARDS

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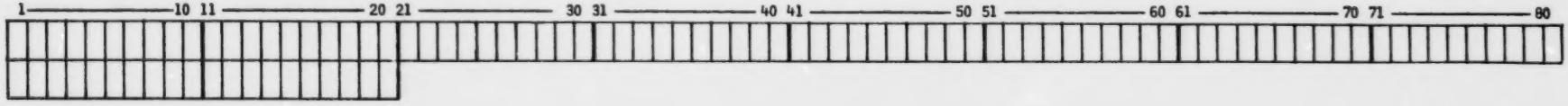
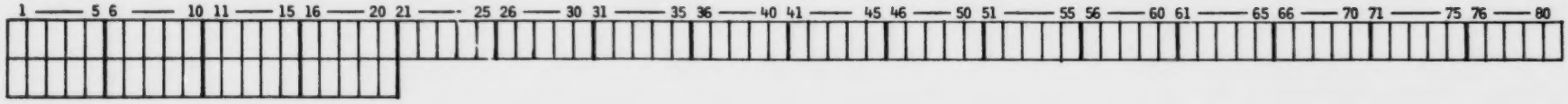
CARD NO. 7

(CTE(I),I=1,N11) FORMAT(9F10.0) N11 $\leq$ 10



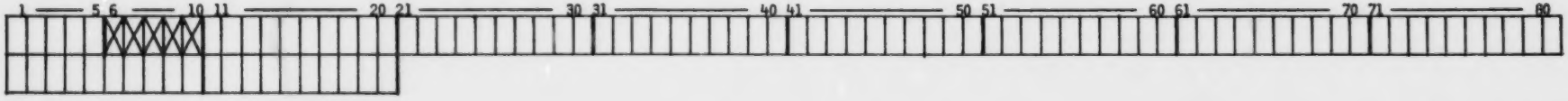
CARD NO. 8

(NSON(I),I=1,IABS(NSO*2) FORMAT(16I5) IABS(NSO) $\leq$ 10



CARD NO. 9

NR,(NTYRC(I),I=1,NRC) FORMAT(I5,5X,10R(NR))



MEG2100 - OPTION CARDS

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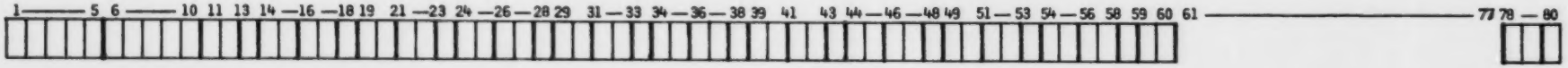
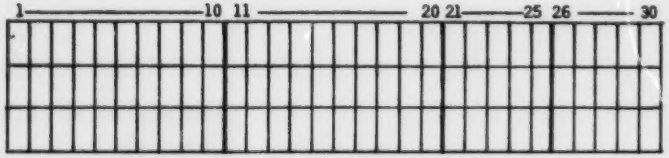
CARD NO. 10

(NOINDW,NOIND,(NV(I),NL(I),ND(I),I=1,10),L,LOG2)FORMAT(2I5,10(I2,A1,I2),I2,A1)



CARD NO. 11

(VMIN(I) VMAX(I), MV1(I) MV2(I), I=1,NOINDW) FORMAT(2F10.0,2I5)



CARD NO. 12

(TITLE(I),(=1,8) FORMAT(8R10)

CARDS NO 10, 11 AND 12 ARE REPEATED FOR EACH REGRESSION APPLIED.

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 5 OF 5
NAME _____

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2100,
PFNI=                    ,(PERMANENT FILE NAME OF INPUT DATA FILE)
Q2=                      ,NUMBER OF SAMPLES.
Q3=                      ,NUMBER OF INDEPENDENT VARIABLES (IF WE USE REGRESSION)
Q5=                      ,Q3+1
Q6=                      ,NUMBER OF CLASSES OF DATA TO BE EVENLY WEIGHED PLUS ONE
```

CHAPTER 3.0
EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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PAGE 1 OF 5
NAME RE

CARD NO. 1

N11	IREJ	NCHOIX	MST	NOUT	NFOR	NSR	NSO	NC	NCTE
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50
2	1	0	5	3	1	0	0	0	0

NBORN	IN	NRC
51 — 55	56 — 60	61 — 65
0	0	0

FORMAT(13I5)

CARD NO. 2

(INV(I),I=1,N11) FORMAT(10I5)

1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50
0	0								

CARD NO. 3 (NOT USED)

(BINF(I),BSUP(I),I=1,N11) FORMAT(8F10.0)

1 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 20-9-82
PAGE 2 OF 5
NAME RF

CARD NO. 4
(TITLE(I),I=1,8) FORMAT(8A10)

1 80
STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

CARD NO. 5
(FTN(I),I=1,8) FORMAT(8A10)

1 80
(1X,I4,3X,3F8.0,2F15.4,I1)

INPUT DATA CARDS FOLLOWS IF IN. GT. 0

17

CARD NO. 6 (NOT USED)
(CXRI(I),CXRS(I),CYRI(I),CYRS(I),(CZRI(I),CZRS(I),I=1,NC) FORMAT(6F10.0)

1 10 11 20 21 30 31 40 41 50 51 60

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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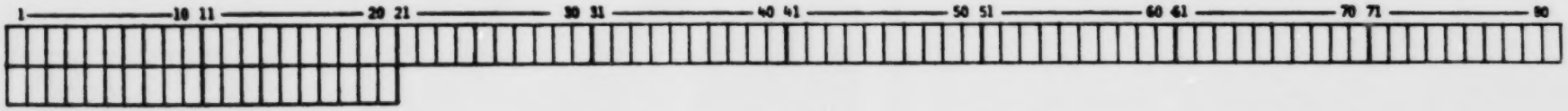
PAGE 3 OF 5
NAME

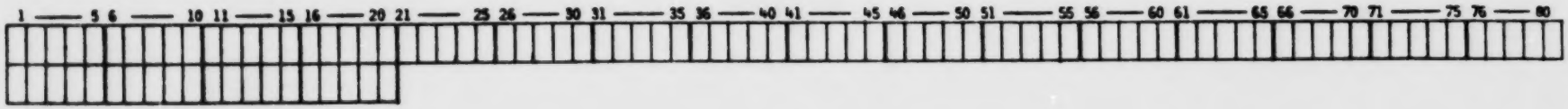
CARD NO. 7 (NOT USED)

(CTE(I),I=1,N11) FORMAT(9F10.0) N11 ≤ 10



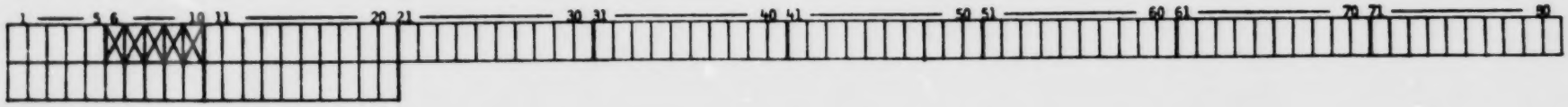
CARD NO. 8 (NOT USED)

(NSON(I),I=1,IABS(NSO*2) FORMAT(16I5) IABS(NSO) ≤ 10



CARD NO. 9 (NOT USED)

NR,(NTYRC(I),I=1,NRC) FORMAT(I5,5X,10R(NR))



MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 20-9-82
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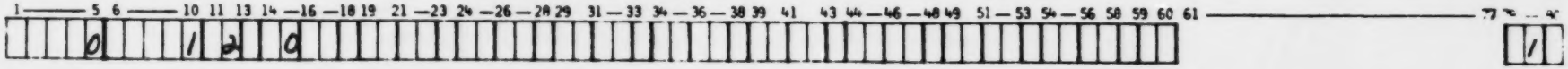
NAME RE

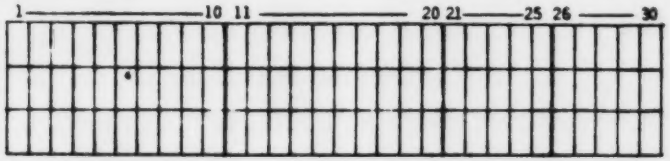
CARD NO. 10

(NOINDW,NOIND,(NV(I),NL(I),ND(I),I=1,10),L,LOG2)FORMAT(2I5,10(I2,A1,I2),I2,A1)



CARD NO. 11 (NOT USED)

(VMIN(I) VMAX(I), MV1(I) MV2(I), I=1,NOINDW) FORMAT(2F10.0,2I5)



CARD NO. 12

(TITLE(I),(=1,8) FORMAT(8R10)

CARDS NO 10, 11 AND 12 ARE REPEATED FOR EACH REGRESSION APPLIED.

MEG2100 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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PAGE 5 OF 5
NAME RS

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2100,
PFNI=MEG2100TESTDATA,(PERMANENT FILE NAME OF INPUT DATA FILE)
Q2= 300                 ,NUMBER OF SAMPLES.
Q3= 1                   ,NUMBER OF INDEPENDENT VARIABLES (IF WE USE REGRESSION)
Q5= 2                   ,Q3+1
Q6= 2                   ,NUMBER OF CLASSES OF DATA TO BE EVENLY WEIGHED PLUS ONE
```

```
PROGRAM GEM2100    73/74   OPT=1                          FTN 4.8+528        20/09/82  10.40.46        PAGE     1

      PROGRAM GEM2100(INPUT,OUTPUT,TAPE1=INPUT,TAPE6=OUTPUT,
     -                TAPE7,TAPE8,TAPE9,TAPE10,TAPE11)
      REAL Z(300),W(300),S(2,2),SUM(2),
     -     SD(2),CR(2),AV(1),XY(2),
     -          B(1),T(1),SEB(1),AWT(2)
      INTEGER NORD(1),IORD(1)
C*     NUMBER OF SAMPLES
      K2=300
C*     NUMBER OF INDEPENDANT VARIABLES, IF WE USE THE REGRESSION
C*     OTHERWISE K3=1.
      K3=1
      K5=1+1
C*     NUMBER OF CLASSES OF DATA TO BE EVENLY WEIGHTED PLUS ONE
      K6=2
      CALL MEG2100(Z,W,S,SUM,SD,XY,CR,AV,B,T,SEB,NORD,IORD,AWT,K2,K3,K5,
     -             K6)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	NII=	2	TOTAL NUMBER OF VARIABLES STUDIED;
	IREJ=	1	OPTION ALLOWING THE REJECTION OF VARIABLE VALUES SURPASSING THE MEAN PLUS THREE STANDARD DEVIATIONS (IREJ=1);
	NCHOIX=	0	OPTION ALLOWING USER TO CHOOSE SAMPLES AT EQUAL INTERVALS ON DATA FILE;
	MST=	5	FACTOR USED IN DETERMINING THE GREATEST NUMBER OF HISTOGRAM CLASSES TO BE APPLIED;
	NOUT=	3	PRINTING OPTION FOR SAMPLING AND REGRESSION DATA;
	NFOR=	1	READING OPTION FOR CHOOSING TYPE OF DATA FORMAT;
	NSR=	0	OPTION DETERMINING THE METHOD BY WHICH STATISTICAL ANALYSIS IS TO BE DONE;
	NSO=	0	OPTION ALLOWING THE RETENTION OR REJECTION OF DRILL HOLE NUMBER RANGES;
	NC=	0	NUMBER OF SPATIAL SECTIONS TO BE STUDIED;
	NCTE=	0	OPTION ALLOWING USER TO INCREASE VARIABLE VALUES BY A CONSTANT FACTOR;
	NBORN=	0	OPTION ALLOWING USER TO LIMIT VARIABLE VALUES;
	IN=	0	OPTION ALLOWING USER TO SPECIFY DATA ON INPUT (IN.GT.0) INSTEAD OF ON TAPE8;
	NRC=	0	NUMBER OF ROCK CODES TO BE KEPT FOR ANALYSIS;
2	INV(1)=	0	
	INV(3)=	0	INVERSE OPTIONS ASSOCIATED WITH EACH VARIABLE;
4	TITLE=	STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED	TITLE-HEADING FOR IDENTIFYING THIS EXECUTION;
5	FTN=	(1X,I4,2R6,3F2.0,2F15.4,I1)	FORMAT TO BE USED TO READ IN DATA;

SECTION 2 - LIST INPUT DATA

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

DESCRIPTION OF THE VARIABLES

NS - MEG SAMPLE NUMBER (DRILL HOLE NUMBER);
IS - COMPANY SAMPLE NUMBER;
IRC - SAMPLE ROCK CODE;
CX - DEPARTURE OR X-COORDINATE OF SAMPLE;
CY - LATITUDE OR Y-COORDINATE OF SAMPLE;
CZ - ELEVATION OF Z-COORDINATE OF SAMPLE;

X(I) - VARIABLE VALUES ASSOCIATED WITH A SINGLE OBSERVATION; THE UNEVEN INDICES REPRESENT THE VALUES READ, WHEREAS THE EVEN INDICES REPRESENT NATURAL LOGARITHMS OF THEIR RESPECTIVE PREDECESSORS;
IR - REJECTION INDICATOR FOR SAMPLE READ IN;

WRITTEN FORMAT IS (1X,I6,2R6,3F2.0,2F15.4,I1)

1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

1	0.0.0.	6.3360	4.14430
2	0.0.0.	9.3256	13.08910
3	0.0.0.	11.9199	14.87760
4	0.0.0.	12.6961	8.24220
5	0.0.0.	9.0318	7.15080
6	0.0.0.	5.9946	6.57690
7	0.0.0.	7.8734	8.91640
8	0.0.0.	7.0837	8.24280
9	0.0.0.	16.7651	16.60690
10	0.0.0.	7.2119	6.86800
11	0.0.0.	12.4590	13.62740
12	0.0.0.	27.0612	26.90070
13	0.0.0.	4.7970	4.25850
14	0.0.0.	9.2894	8.57040
15	0.0.0.	6.5737	7.48400
16	0.0.0.	4.4881	3.04580
17	0.0.0.	2.2970	3.58920
18	0.0.0.	7.8593	8.05860
19	0.0.0.	7.3576	4.83010
20	0.0.0.	3.4502	2.94450
21	0.0.0.	2.3376	3.61560
22	0.0.0.	7.1003	5.83140
23	0.0.0.	18.8834	18.83280
24	0.0.0.	6.7175	8.21600
25	0.0.0.	4.6649	4.51660
26	0.0.0.	4.2373	3.23940
27	0.0.0.	6.4561	7.94550
28	0.0.0.	11.8524	12.92850
29	0.0.0.	9.2775	10.94350
30	0.0.0.	8.9079	7.77750
31	0.0.0.	5.5060	6.88320
32	0.0.0.	13.5498	8.49630
33	0.0.0.	8.7158	9.25450
34	0.0.0.	4.9767	4.57430
35	0.0.0.	5.0610	6.90230
36	0.0.0.	7.0226	5.77660
37	0.0.0.	15.9945	16.04690
38	0.0.0.	6.1472	6.40910
39	0.0.0.	8.3477	7.83650
40	0.0.0.	2.6773	2.83680
41	0.0.0.	4.4205	6.20950
42	0.0.0.	6.5732	7.06610
43	0.0.0.	9.5145	8.26280
44	0.0.0.	3.9921	3.36590
45	0.0.0.	8.4647	9.29730
46	0.0.0.	5.6918	5.37070
47	0.0.0.	9.5594	10.50140
48	0.0.0.	9.3947	10.35600
49	0.0.0.	5.7161	5.25670
50	0.0.0.	5.5148	5.91300
51	0.0.0.	8.3372	8.58890
52	0.0.0.	13.4205	9.62610
53	0.0.0.	14.2974	14.94080
54	0.0.0.	12.4224	11.68480
55	0.0.0.	6.6797	6.17170
56	0.0.0.	5.3790	6.14790
57	0.0.0.	11.5260	11.77210
58	0.0.0.	5.6800	6.43430
59	0.0.0.	9.4500	5.85910

62	0.0.0.	4.4178	7.45450
63	0.0.0.	12.6373	14.06530
64	0.0.0.	6.8665	3.56570
65	0.0.0.	4.8600	7.18190
66	0.0.0.	18.2918	18.79440
67	0.0.0.	12.1697	13.80700
68	0.0.0.	12.1372	10.93190
69	0.0.0.	11.8409	7.60380
70	0.0.0.	9.2972	13.90580
71	0.0.0.	9.5591	7.43530
72	0.0.0.	4.4496	6.58940
73	0.0.0.	9.4524	8.51220
74	0.0.0.	17.8039	19.96280
75	0.0.0.	8.9909	5.69190
76	0.0.0.	7.6753	6.72610
77	0.0.0.	4.5514	4.35860
78	0.0.0.	4.5427	6.45100
79	0.0.0.	7.7373	8.07240
80	0.0.0.	10.1120	9.71760
81	0.0.0.	5.2777	8.04580
82	0.0.0.	11.0945	6.70570
83	0.0.0.	4.9735	4.73180
84	0.0.0.	8.0090	11.88630
85	0.0.0.	5.9665	4.21000
86	0.0.0.	4.8559	6.60120
87	0.0.0.	12.0653	9.19160
88	0.0.0.	5.1965	5.39820
89	0.0.0.	8.3164	8.33980
90	0.0.0.	4.9047	5.05370
91	0.0.0.	3.8497	3.22560
92	0.0.0.	5.4874	7.22450
93	0.0.0.	10.5745	7.49290
94	0.0.0.	10.7209	13.44660
95	0.0.0.	4.0326	3.24350
96	0.0.0.	4.0538	6.43370
97	0.0.0.	16.4029	20.01530
98	0.0.0.	12.8906	8.16040
99	0.0.0.	5.6287	5.63570
100	0.0.0.	5.0898	6.23270

SECTION 3 = LIST OF ACCEPTED VALUES FOR VARIABLE 1 (SORTED)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

TOTAL NUMBER OF OBSERVATIONS
FOR VARIABLE 1: 100

DESCRIPTION OF THE VARIABLES

I = OBSERVATION INDICES GIVEN BY THE PROGRAM:

X(I) = VALUE OF I'TH OBSERVATION FOR VARIABLE:

I	X(I)	I	X(I)	I	X(I)	I	X(I)	I	X(I)
1	.2297000E+01	2	.2337600E+01	3	.2677300E+01	4	.3450200E+01	5	.3849700E+01
6	.3992100E+01	7	.4032600E+01	8	.4053800E+01	9	.4237300E+01	10	.4417800E+01
11	.4420500E+01	12	.4449600E+01	13	.4488100E+01	14	.4542700E+01	15	.4551400E+01
16	.4664900E+01	17	.4797000E+01	18	.4855900E+01	19	.4860000E+01	20	.4904700E+01
21	.4973500E+01	22	.4976700E+01	23	.5061000E+01	24	.5089800E+01	25	.5196500E+01
26	.5277700E+01	27	.5379000E+01	28	.5487400E+01	29	.5506000E+01	30	.5514800E+01
31	.5628700E+01	32	.5680000E+01	33	.5691800E+01	34	.5716100E+01	35	.5750400E+01
36	.5966500E+01	37	.5994600E+01	38	.6147200E+01	39	.6336000E+01	40	.6456100E+01
41	.6573200E+01	42	.6573700E+01	43	.6679700E+01	44	.6717500E+01	45	.6866500E+01
46	.7022600E+01	47	.7083700E+01	48	.7100300E+01	49	.7211900E+01	50	.7357600E+01
51	.7675300E+01	52	.7737300E+01	53	.7859300E+01	54	.7873400E+01	55	.8009000E+01
56	.8316400E+01	57	.8337200E+01	58	.8347700E+01	59	.8464700E+01	60	.8715800E+01
61	.8907900E+01	62	.8990900E+01	63	.9031800E+01	64	.9277500E+01	65	.9289400E+01
66	.9297200E+01	67	.9325600E+01	68	.9394700E+01	69	.9450000E+01	70	.9452400E+01
71	.9514500E+01	72	.9559100E+01	73	.9559400E+01	74	.1011200E+02	75	.1057450E+02
76	.1072090E+02	77	.1109450E+02	78	.1152600E+02	79	.1184090E+02	80	.1185240E+02
81	.1191990E+02	82	.1206530E+02	83	.1213720E+02	84	.1216970E+02	85	.1242240E+02
86	.1245900E+02	87	.1263730E+02	88	.1269610E+02	89	.1289060E+02	90	.1342050E+02
91	.1354980E+02	92	.1429740E+02	93	.1599450E+02	94	.1640290E+02	95	.1676510E+02
96	.1780390E+02	97	.1792030E+02	98	.1829180E+02	99	.1888340E+02	100	.2706120E+02

SECTION 4 - STATISTICS OF VARIABLE 1 (IREJ=0)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

100 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

100	NOBS	7.516450	MEDIAN	24.764200	RANGE
8.447927	ARITHMETIC MEAN	7.560361	GEOMETRIC MEAN	6.740069	HARMONIC MEAN
18.085388	VARIANCE	4.252692	STANDARD DEVIATION	.503401	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.84479270E+01	.89272005E+02	.11619690E+04	.18163951E+05
FIRST FOUR MOMENTS ABOUT THE MEAN	.11414159E-11	.17904534E+02	.10529322E+03	.18457893E+04
FIRST FOUR K-STATISTICS	.11414159E-11	.18085388E+02	.10852733E+03	.96924147E+03

1.389811	SKEWNESS (ESTIMATED FROM MOMENTS)	1.411066	SKEWNESS (ESTIMATED FROM K-STATISTICS)
2.757793	KURTOSIS (ESTIMATED FROM MOMENTS)	2.961305	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 4 - STATISTICS OF VARIABLE 1 (IREJ=1)

THE LARGEST 1 SAMPLES ARE REJECTED

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

99 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

99	NOBS	7.357600	MEDIAN	16.586400	RANGE
8.259914	ARITHMETIC MEAN	7.443660	GEOMETRIC MEAN	6.689329	HARMONIC MEAN
14.698979	VARIANCE	3.833925	STANDARD DEVIATION	.464160	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.82599141E+01	.82776686E+02	.97353284E+03	.12930498E+05
FIRST FOUR MOMENTS ABOUT THE MEAN	.11070112E-11	.14550504E+02	.49432685E+02	.68609468E+03
FIRST FOUR K-STATISTICS	.11070112E-11	.14698979E+02	.50966731E+02	.68355540E+02

.890430	SKEWNESS (ESTIMATED FROM MOMENTS)	.904391	SKEWNESS (ESTIMATED FROM K-STATISTICS)
.240619	KURTOSIS (ESTIMATED FROM MOMENTS)	.314373	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 5 - HISTOGRAM AND CUMULATIVE FREQUENCY DIAGRAM

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

NO. OF OBSERVATIONS = 99

MINIMUM = 2.29700 MAXIMUM = 18.8834 MEAN = 8.25091

UPPER LIMIT	FREQ	REL FREQ	CUM FREQ	RELATIVE FREQUENCY DIAGRAM	CUMULATIVE FREQUENCY DIAGRAM
2.509	2	2.02	2.02	1**	1*
3.468	2	2.02	4.04	1**	1**
4.426	7	7.07	11.11	1**********	1******
5.384	16	16.16	27.27	1**************************	1***************
6.343	12	12.12	39.39	1********************	1********************
7.301	10	10.10	49.49	1****************	1*************************
8.260	6	6.06	55.56	1*********	1******************************
9.218	8	8.08	63.64	1************	1***********************************
10.177	11	11.11	74.75	1******************	1**
11.135	3	3.03	77.78	1*****	1***
12.094	5	5.05	82.83	1********	1**
13.052	7	7.07	89.90	1**********	1**
14.011	2	2.02	91.92	1**	1**
14.969	1	1.01	92.93	1*	1**
15.928	0	0.00	92.93	1	1**
> 15.928	7	7.07	100.00	1**********	1**

SECTION 6 - TABLE OF CUMULATIVE FREQUENCY VALUES USED IN THE FOLLOWING GRAPH

DESCRIPTION OF THE VARIABLES

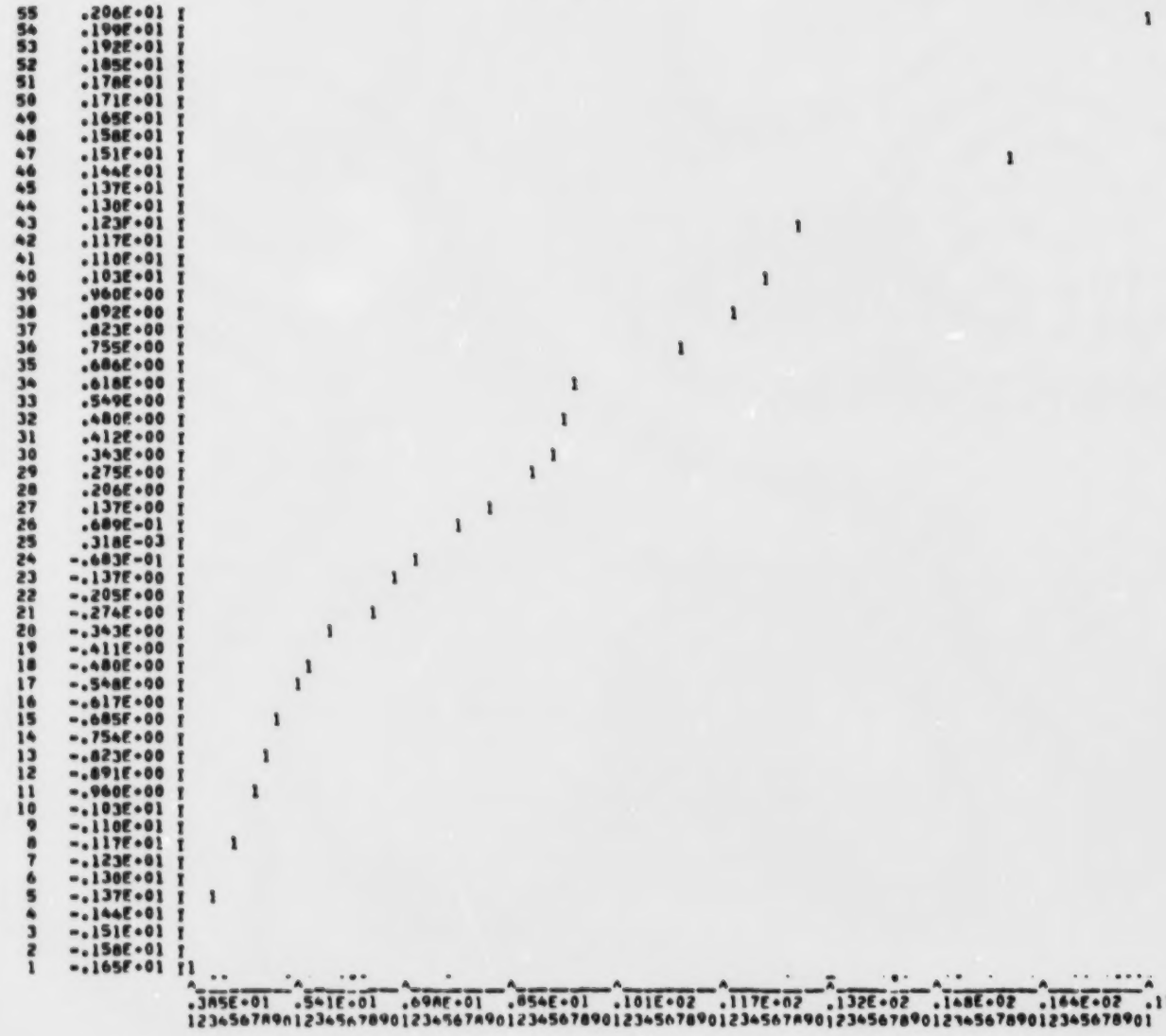
I - INDICE DEFINED BY THE PROGRAM!

X(I) - VARIABLE VALUE!

Y(I) - STANDARD (T) VARIABLE GIVEN BY THE EXPERIMENTAL CUMULATIVE FREQUENCY!

I	X(I)	Y(I)	I	X(I)	Y(I)	I	X(I)	Y(I)
1	3.850	-1.646	2	4.237	-1.341	3	4.488	-1.125
4	4.797	-.951	5	4.974	-.799	6	5.197	-.670
7	5.506	-.547	8	5.692	-.432	9	5.995	-.323
10	6.573	-.217	11	6.867	-.119	12	7.212	-.013
13	7.859	.089	14	8.337	.191	15	8.908	.297
16	9.289	.403	17	9.450	.518	18	9.559	.647
19	11.095	.767	20	11.920	.913	21	12.422	1.079
22	12.891	1.282	23	15.995	1.554	24	17.920	2.048

CUMULATIVE FREQUENCY GRAPH



SECTION 7 - TEST FOR GOODNESS OF FIT BETWEEN EXPERIMENTAL AND THEORETICAL DISTRIBUTIONS

*** UNDEFINED ERROR (IER = *****) FROM IMSL ROUTINE GFIT

C H I - S Q U A R E T E S T

THE PROBABILITY OF THE CHI-SQUARE STATISTIC EXCEEDING 36.27273
WITH 13 DEGREE OF FREEDOM, IS .05382 PERCENT

ONE CAN REJECT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH .05382 PERCENT PROBABILITY OF BEING INCORRECT

K O L M O G O R O V - S M I R N O V T E S T

THE PROBABILITY OF THE STATISTIC BEING GREATER THAN OR EQUAL TO 1.04175
IF THE HYPOTHESIS THAT X IS FROM THE DENSITY UNDER CONSIDERATION IS TRUE,
IS 22.79062 PERCENT

ONE CAN ACCEPT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 22.79062 PERCENT PROBABILITY OF BEING CORRECT

D = .10470 K+= .10470 K-= .08460

THE PROBABILITY OF THE STATISTIC EXCEEDING 1.04175 ,IF THE HYPOTHESIS
OF EQUALITY IS TRUE AND THE ALTERNATIVE IS ONE SIDED , IS 11.41227 PERCENT

SECTION 3 - LIST OF ACCEPTED VALUES FOR VARIABLE 1 (LOG) (SORTED)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

TOTAL NUMBER OF OBSERVATIONS FOR VARIABLE 1: 100

DESCRIPTION OF THE VARIABLES

I - OBSERVATION INDICES GIVEN BY THE PROGRAM:

X(I) - VALUE OF I'TH OBSERVATION FOR VARIABLE:

I	X(I)	I	X(I)	I	X(I)	I	X(I)	I	X(I)
1	.8316039E+00	2	.8491248E+00	3	.9848088E+00	4	.1238432E+01	5	.1347995E+01
6	.1384317E+01	7	.1394411E+01	8	.1399655E+01	9	.1443926E+01	10	.1485642E+01
11	.1486253E+01	12	.1492814E+01	13	.1501429E+01	14	.1513522E+01	15	.1515435E+01
16	.1540066E+01	17	.1567991E+01	18	.1580194E+01	19	.1581038E+01	20	.1590194E+01
21	.1604124E+01	22	.1604767E+01	23	.1621564E+01	24	.1627239E+01	25	.1647985E+01
26	.1663490E+01	27	.1682502E+01	28	.1702455E+01	29	.1705838E+01	30	.1707435E+01
31	.1727879E+01	32	.1736951E+01	33	.1739027E+01	34	.1743287E+01	35	.1749269E+01
36	.1786160E+01	37	.1790859E+01	38	.1815997E+01	39	.1846248E+01	40	.1865025E+01
41	.1883001E+01	42	.1883077E+01	43	.1899073E+01	44	.1904716E+01	45	.1926655E+01
46	.1949134E+01	47	.1957796E+01	48	.1960137E+01	49	.1975732E+01	50	.1995734E+01
51	.2038007E+01	52	.2046053E+01	53	.2061698E+01	54	.2063490E+01	55	.2080566E+01
56	.2118229E+01	57	.2120727E+01	58	.2121986E+01	59	.2135905E+01	60	.2165137E+01
61	.2186939E+01	62	.2196213E+01	63	.2200752E+01	64	.2227592E+01	65	.2228874E+01
66	.2229713E+01	67	.2232763E+01	68	.2240146E+01	69	.2246015E+01	70	.2246269E+01
71	.2252817E+01	72	.2257494E+01	73	.2257525E+01	74	.2313723E+01	75	.2358445E+01
76	.2372195E+01	77	.2406449E+01	78	.2444605E+01	79	.2471560E+01	80	.2472530E+01
81	.2478209E+01	82	.2490334E+01	83	.2496275E+01	84	.2498949E+01	85	.2519501E+01
86	.2522443E+01	87	.2536653E+01	88	.2541295E+01	89	.2556498E+01	90	.2596783E+01
91	.2606372E+01	92	.2660078E+01	93	.2772245E+01	94	.2797458E+01	95	.2819299E+01
96	.2879418E+01	97	.2885934E+01	98	.2906453E+01	99	.2938283E+01	100	.3298101E+01

SECTION 4 - STATISTICS OF VARIABLE 1 (LOG) (IREJ=0)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

100 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

100	NOBS	2.016871	MEDIAN	2.466497	RANGE
2.020270	ARITHMETIC MEAN	1.960164	GEOMETRIC MEAN	1.893916	HARMONIC MEAN
.228975	VARIANCE	.478514	STANDARD DEVIATION	.236856	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.20202701E+01	.43081767E+01	.96244656E+01	.22393045E+02
FIRST FOUR MOMENTS ABOUT THE MEAN	.28180125E-12	.22668549E+00	.48531846E-02	.14396650E+00
FIRST FOUR K-STATISTICS	.28180125E-12	.22897524E+00	.58022517E-02	-.76625524E-02

.044967	SKEWNESS (ESTIMATED FROM MOMENTS)	.045654	SKEWNESS (ESTIMATED FROM K-STATISTICS)
-.198349	KURTOSIS (ESTIMATED FROM MOMENTS)	-.146149	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 5 - HISTOGRAM AND CUMULATIVE FREQUENCY DIAGRAM

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

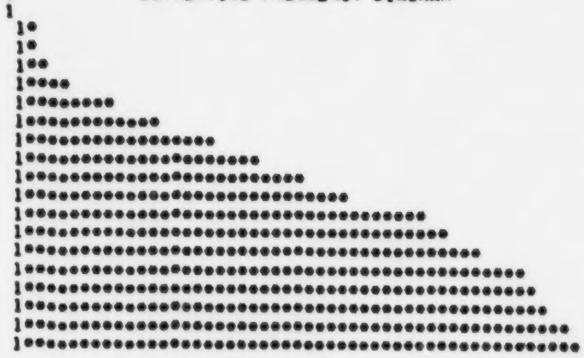
NO. OF OBSERVATIONS = 100

MINIMUM = .831604 MAXIMUM = 3.29810 MEAN = 2.02027

UPPER LIMIT	FREQ	REL FREQ	CUM FREQ
1.063	3	3.00	3.00
1.183	0	0.00	3.00
1.302	1	1.00	4.00
1.422	4	4.00	8.00
1.542	8	8.00	16.00
1.661	9	9.00	25.00
1.781	10	10.00	35.00
1.901	8	8.00	43.00
2.020	7	7.00	50.00
2.140	9	9.00	59.00
2.260	14	14.00	73.00
2.379	3	3.00	76.00
2.499	7	7.00	83.00
2.618	8	8.00	91.00
2.738	1	1.00	92.00
2.858	3	3.00	95.00
2.977	4	4.00	99.00
> 2.977	1	1.00	100.00

RELATIVE FREQUENCY DIAGRAM

CUMULATIVE FREQUENCY DIAGRAM



SECTION 6 - TABLE OF CUMULATIVE FREQUENCY VALUES USED IN THE FOLLOWING GRAPH

DESCRIPTION OF THE VARIABLES

I - INDICE DEFINED BY THE PROGRAM;

X(I) - VARIABLE VALUE;

Y(I) - STANDARD (T) VARIABLE GIVEN BY THE EXPERIMENTAL CUMULATIVE FREQUENCY;

I	X(I)	Y(I)	I	X(I)	Y(I)	I	X(I)	Y(I)
1	1.384	-1.560	2	1.486	-1.230	3	1.540	-.995
4	1.604	-.807	5	1.663	-.644	6	1.728	-.498
7	1.786	-.360	8	1.883	-.228	9	1.949	-.101
10	2.038	.025	11	2.118	.151	12	2.187	.281
13	2.230	.413	14	2.253	.555	15	2.372	.710
16	2.478	.882	17	2.522	1.084	18	2.606	1.346
19	2.879	1.757						

CUMULATIVE FREQUENCY GRAPH

SECTION 7 - TEST FOR GOODNESS OF FIT BETWEEN EXPERIMENTAL AND THEORETICAL DISTRIBUTIONS

*** UNDEFINED ERROR (IER = *****) FROM IMSL ROUTINE GFIT

C H I - S Q U A R E T E S T

THE PROBABILITY OF THE CHI-SQUARE STATISTIC EXCEEDING 14.84000
WITH 15 DEGREE OF FREEDOM, IS 46.30026 PERCENT

ONE CAN REJECT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 46.30026 PERCENT PROBABILITY OF BEING INCORRECT

K O L M O G O R O V - S M I R N O V T E S T

THE PROBABILITY OF THE STATISTIC BEING GREATER THAN OR EQUAL TO .64418
IF THE HYPOTHESIS THAT X IS FROM THE DENSITY UNDER CONSIDERATION IS TRUE,
IS 80.09650 PERCENT

ONE CAN ACCEPT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 80.09650 PERCENT PROBABILITY OF BEING CORRECT

D = .06442 K+= .06442 K-= .04719

THE PROBABILITY OF THE STATISTIC EXCEEDING .64418 ,IF THE HYPOTHESIS
OF EQUALITY IS TRUE AND THE ALTERNATIVE IS ONE SIDED , IS 43.60755 PERCENT

SECTION 3 - LIST OF ACCEPTED VALUES FOR VARIABLE 2 (SORTED)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

TOTAL NUMBER OF OBSERVATIONS FOR VARIABLE 2: 100

DESCRIPTION OF THE VARIABLES

I - OBSERVATION INDICES GIVEN BY THE PROGRAM:

X(I) - VALUE OF I'TH OBSERVATION FOR VARIABLE:

I	X(I)	I	X(I)	I	X(I)	I	X(I)	I	X(I)
1	.2836800E+01	2	.2944500E+01	3	.3045800E+01	4	.3225600E+01	5	.3239400E+01
6	.3243500E+01	7	.3365900E+01	8	.3565700E+01	9	.3589200E+01	10	.3615600E+01
11	.4144300E+01	12	.4210000E+01	13	.4258500E+01	14	.4358600E+01	15	.4516600E+01
16	.4574300E+01	17	.4731800E+01	18	.4830100E+01	19	.5053700E+01	20	.5256700E+01
21	.5370700E+01	22	.5398200E+01	23	.5635700E+01	24	.5691900E+01	25	.5776600E+01
26	.5831400E+01	27	.5859100E+01	28	.5913000E+01	29	.6147900E+01	30	.6171700E+01
31	.6209500E+01	32	.6232700E+01	33	.6409100E+01	34	.6433700E+01	35	.6434300E+01
36	.6451000E+01	37	.6576900E+01	38	.6589400E+01	39	.6601200E+01	40	.6705700E+01
41	.6726100E+01	42	.6868000E+01	43	.6883200E+01	44	.6902300E+01	45	.7066100E+01
46	.7150800E+01	47	.7181900E+01	48	.7224500E+01	49	.7435300E+01	50	.7454500E+01
51	.7484000E+01	52	.7492900E+01	53	.7603800E+01	54	.7777500E+01	55	.7836500E+01
56	.7945500E+01	57	.8045800E+01	58	.8058600E+01	59	.8072400E+01	60	.8160400E+01
61	.8216000E+01	62	.8242200E+01	63	.8242800E+01	64	.8262800E+01	65	.8339800E+01
66	.8496300E+01	67	.8512200E+01	68	.8570400E+01	69	.8588900E+01	70	.8916400E+01
71	.9191600E+01	72	.9254500E+01	73	.9297300E+01	74	.9626100E+01	75	.9717600E+01
76	.1014350E+02	77	.1035600E+02	78	.1050140E+02	79	.1093190E+02	80	.1094350E+02
81	.1113240E+02	82	.1168480E+02	83	.1177210E+02	84	.1188630E+02	85	.1292850E+02
86	.1308910E+02	87	.1344660E+02	88	.1362740E+02	89	.1380700E+02	90	.1390580E+02
91	.1406530E+02	92	.1487760E+02	93	.1494080E+02	94	.1604690E+02	95	.1660690E+02
96	.1879440E+02	97	.1883280E+02	98	.1996280E+02	99	.2001530E+02	100	.2690070E+02

SECTION 4 - STATISTICS OF VARIABLE 2 (IREJ=0)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

100 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

100	NOBS	7.469250	MEDIAN	24.063900	RANGE
8.430911	ARITHMETIC MEAN	7.532111	GEOMETRIC MEAN	6.761066	HARMONIC MEAN
18.541521	VARIANCE	4.305987	STANDARD DEVIATION	.510738	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.84309110E+01	.89436366E+02	.11839714E+04	.18966247E+05
FIRST FOUR MOMENTS ABOUT THE MEAN	.11675638E-11	.18356106E+02	.12042400E+03	.20241666E+04
FIRST FOUR K-STATISTICS	.11675638E-11	.18541321E+02	.12412284E+03	.11090038E+04

1.531236	SKEWNESS (ESTIMATED FROM MOMENTS)	1.554654	SKEWNESS (ESTIMATED FROM K-STATISTICS)
3.007381	KURTOSIS (ESTIMATED FROM MOMENTS)	3.225836	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 4 - STATISTICS OF VARIABLE 2 (IREJ=1)

THE LARGEST 1 SAMPLES ARE REJECTED

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

99 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

99	NOBS	7.454500	MEDIAN	17.178500	RANGE
8.244347	ARITHMETIC MEAN	7.435880	GEOMETRIC MEAN	6.710321	HARMONIC MEAN
15.214609	VARIANCE	3.900591	STANDARD DEVIATION	.473123	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.82443475E+01	.83030191E+02	.99929813E+03	.13868278E+05
FIRST FOUR MOMENTS ABOUT THE MEAN	.11024178E-11	.15060926E+02	.66433363E+02	.91556979E+03
FIRST FOUR K-STATISTICS	.11024178E-11	.15214609E+02	.68494992E+02	.26708618E+03

1.136603	SKEWNESS (ESTIMATED FROM MOMENTS)	1.154164	SKEWNESS (ESTIMATED FROM K-STATISTICS)
1.036343	KURTOSIS (ESTIMATED FROM MOMENTS)	1.153798	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 5 - HISTOGRAM AND CUMULATIVE FREQUENCY DIAGRAM

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

NO. OF OBSERVATIONS = 99

MINIMUM = 2.83680 MAXIMUM = 20.0153 MEAN = 8.24435

	UPPER LIMIT	FREQ	REL FREC	CUM FREQ	RELATIVE FREQUENCY DIAGRAM	CUMULATIVE FREQUENCY DIAGRAM
	3.369	7	7.07	7.07	1**********	1****
	4.344	6	6.06	13.13	1*********	1*******
	5.319	7	7.07	20.20	1**********	1**********
	6.294	12	12.12	32.32	1******************	1******************
	7.269	16	16.16	48.48	1************************	1**********•**********
	8.244	15	15.15	63.64	1**********************	1**********•**********************
	9.219	8	8.08	71.72	1***********	1**********•**********************************
	10.195	5	5.05	76.77	1*******	1**********•***
	11.170	5	5.05	81.82	1*******	1**********•**
	12.145	3	3.03	84.85	1*****	1**********•**
	13.120	2	2.02	86.87	1***	1**********•**
	14.095	5	5.05	91.92	1*******	1**********•**
	15.070	2	2.02	93.94	1***	1**********•**
	16.046	0	0.00	93.94	1	1**********•**
>	16.046	6	6.06	100.00	1*********	1**********•**

SECTION 6 - TABLE OF CUMULATIVE FREQUENCY VALUES USED IN THE FOLLOWING GRAPH

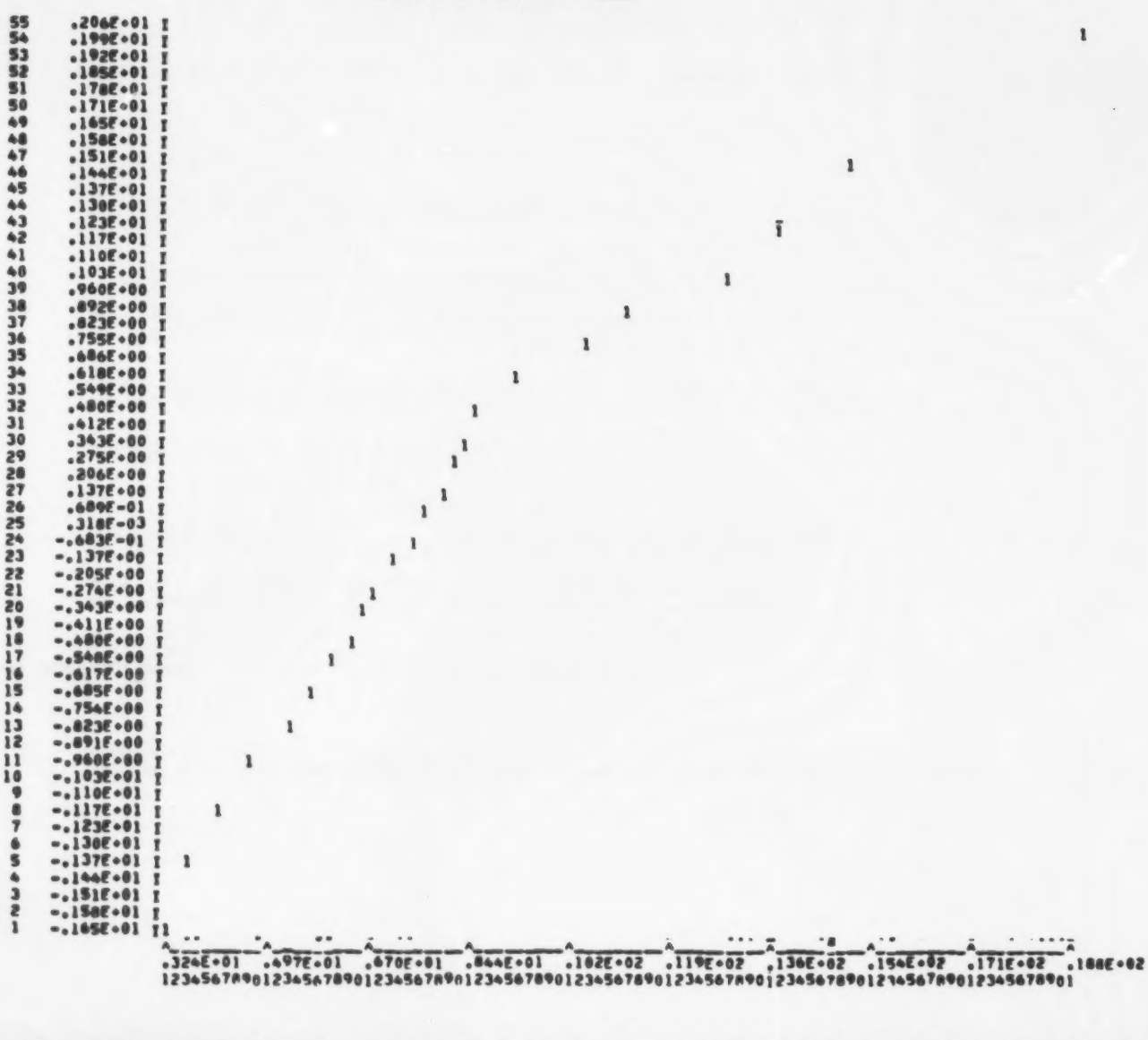
DESCRIPTION OF THE VARIABLES

I - INDICE DEFINED BY THE PROGRAM;

X(I) - VARIABLE VALUE;

Y(I) - STANDARD (T) VARIABLE GIVEN BY THE EXPERIMENTAL CUMULATIVE FREQUENCY;

I	X(I)	Y(I)	I	X(I)	Y(I)	I	X(I)	Y(I)
1	3.239	-1.646	2	3.589	-1.341	3	4.259	-1.125
4	4.732	-.951	5	5.371	-.799	6	5.777	-.670
7	6.148	-.547	8	6.409	-.432	9	6.577	-.323
10	6.726	-.217	11	7.066	-.115	12	7.435	-.013
13	7.604	.089	14	8.046	.191	15	8.216	.297
16	8.340	.403	17	8.589	.518	18	9.297	.637
19	10.356	.767	20	11.132	.913	21	12.929	1.079
22	13.807	1.282	23	14.941	1.555	24	18.833	2.058


CUMULATIVE FREQUENCY GRAPH
55 .206E+01
54 .199E+01
53 .192E+01
52 .185E+01
51 .178E+01
50 .171E+01
49 .165E+01
48 .158E+01
47 .151E+01
46 .144E+01
45 .137E+01
44 .130E+01
43 .123E+01
42 .117E+01
41 .110E+01
40 .103E+01
39 .960E+00
38 .892E+00
37 .823E+00
36 .755E+00
35 .686E+00
34 .618E+00
33 .549E+00
32 .480E+00
31 .412E+00
30 .343E+00
29 .275E+00
28 .206E+00
27 .137E+00
26 .689E-01
25 .318E-03
24 -.683E-01
23 -.137E+00
22 -.205E+00
21 -.274E+00
20 -.343E+00
19 -.411E+00
18 -.480E+00
17 -.548E+00
16 -.617E+00
15 -.685E+00
14 -.754E+00
13 -.823E+00
12 -.891E+00
11 -.960E+00
10 -.103E+01
9 -.110E+01
8 -.117E+01
7 -.123E+01
6 -.130E+01
5 -.137E+01
4 -.144E+01
3 -.151E+01
2 -.158E+01
1 -.165E+01
.324E+01 .497E+01 .670E+01 .844E+01 .102E+02 .119E+02 .136E+02 .154E+02 .171E+02 .188E+02

SECTION 7 - TEST FOR GOODNESS OF FIT BETWEEN EXPERIMENTAL AND THEORETICAL DISTRIBUTIONS

*** UNDEFINED ERROR (IER = *****) FROM IMSL ROUTINE GFIT

C H I - S Q U A R E T E S T

THE PROBABILITY OF THE CHI-SQUARE STATISTIC EXCEEDING 31.45455
WITH 12 DEGREE OF FREEDOM, IS .16787 PERCENT

ONE CAN REJECT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH .16787 PERCENT PROBABILITY OF BEING INCORRECT

K O L M O G O R O V - S M I R N O V T E S T

THE PROBABILITY OF THE STATISTIC BEING GREATER THAN OR EQUAL TO 1.60965
IF THE HYPOTHESIS THAT X IS FROM THE DENSITY UNDER CONSIDERATION IS TRUE,
IS 1.12344 PERCENT

ONE CAN ACCEPT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 1.12344 PERCENT PROBABILITY OF BEING CORRECT

D = .16178 K+= .16178 K-= .08282

THE PROBABILITY OF THE STATISTIC EXCEEDING 1.60965 ,IF THE HYPOTHESIS
OF EQUALITY IS TRUE AND THE ALTERNATIVE IS ONE SIDED , IS .56172 PERCENT

SECTION 3 - LIST OF ACCEPTED VALUES FOR VARIABLE 2 (LOG) (SORTED)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

TOTAL NUMBER OF OBSERVATIONS FOR VARIABLE 2: 100

DESCRIPTION OF THE VARIABLES

I - OBSERVATION INDICES GIVEN BY THE PROGRAM:

X(I) - VALUE OF I'TH OBSERVATION FOR VARIABLE:

I	X(I)	I	X(I)	I	X(I)	I	X(I)	I	X(I)
1	.1042677E+01	2	.1079939E+01	3	.1113764E+01	4	.1171119E+01	5	.1175388E+01
6	.1176653E+01	7	.1213695E+01	8	.1271360E+01	9	.1277929E+01	10	.1285258E+01
11	.1421734E+01	12	.1437463E+01	13	.1448917E+01	14	.1472151E+01	15	.1507759E+01
16	.1520454E+01	17	.1554306E+01	18	.1574867E+01	19	.1620121E+01	20	.1659503E+01
21	.1680958E+01	22	.1686066E+01	23	.1729121E+01	24	.1739044E+01	25	.1753815E+01
26	.1763257E+01	27	.1767996E+01	28	.1777153E+01	29	.1816111E+01	30	.1819974E+01
31	.1826080E+01	32	.1829810E+01	33	.1857719E+01	34	.1861550E+01	35	.1861643E+01
36	.1864235E+01	37	.1883564E+01	38	.1885462E+01	39	.1887251E+01	40	.1902958E+01
41	.1905995E+01	42	.1926873E+01	43	.1929084E+01	44	.1931855E+01	45	.1955309E+01
46	.1967224E+01	47	.1971564E+01	48	.1977478E+01	49	.2006239E+01	50	.2008818E+01
51	.2012767E+01	52	.2013956E+01	53	.2028648E+01	54	.2051235E+01	55	.2058792E+01
56	.2072606E+01	57	.2085150E+01	58	.2086740E+01	59	.2088451E+01	60	.2099293E+01
61	.2106083E+01	62	.2109267E+01	63	.2109340E+01	64	.2111764E+01	65	.2121039E+01
66	.2139631E+01	67	.2141500E+01	68	.2148314E+01	69	.2150471E+01	70	.2187892E+01
71	.2218290E+01	72	.2225110E+01	73	.2229724E+01	74	.2264478E+01	75	.2273939E+01
76	.2316833E+01	77	.2337566E+01	78	.2351509E+01	79	.2391685E+01	80	.2392746E+01
81	.2409860E+01	82	.2458289E+01	83	.2465732E+01	84	.2475386E+01	85	.2559434E+01
86	.2571780E+01	87	.2598726E+01	88	.2612082E+01	89	.2625176E+01	90	.2632306E+01
91	.2643711E+01	92	.2699857E+01	93	.2704096E+01	94	.2775516E+01	95	.2809818E+01
96	.2933559E+01	97	.2935600E+01	98	.2993871E+01	99	.2996497E+01	100	.3292152E+01

SECTION 4 - STATISTICS OF VARIABLE 2 (LOG) (IRPJ=0)

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

100 ACCEPTED OBSERVATIONS USED TO PRODUCE THE FOLLOWING STATISTICS

100	NOBS	2.010793	MEDIAN	2.269476	RANGE
2.019175	ARITHMETIC MEAN	1.961850	GEOMETRIC MEAN	1.901314	HARMONIC MEAN
.223556	VARIANCE	.472817	STANDARD DEVIATION	.234163	COEFFICIENT OF VARIATION

FIRST FOUR MOMENTS ABOUT ZERO	.20191753E+01	.42983892E+01	.95873061E+01	.22292735E+02
FIRST FOUR MOMENTS ABOUT THE MEAN	.29629632E-12	.22132025E+00	.14335994E-01	.14042928E+00
FIRST FOUR K-STATISTICS	.29629632E-12	.22355581E+00	.14776331E-01	-.38730512E-02

.137688	SKEWNESS (ESTIMATED FROM MOMENTS)	.139794	SKEWNESS (ESTIMATED FROM K-STATISTICS)
-.133081	KURTOSIS (ESTIMATED FROM MOMENTS)	-.077496	KURTOSIS (ESTIMATED FROM K-STATISTICS)

SECTION 5 - HISTOGRAM AND CUMULATIVE FREQUENCY DIAGRAM

TITLE = STATISTICS AND REGRESSION OF THICKNESS AND GRADE RANDOMLY GENERATED

NO. OF OBSERVATIONS = 100

MINIMUM = 1.04268 MAXIMUM = 3.29215 MEAN = 2.01918

	UPPER LIMIT	FREQ	REL FREQ	CUM FREQ	RELATIVE FREQUENCY DIAGRAM	CUMULATIVE FREQUENCY DIAGRAM
	1.074	1	1.00	1.00	**	*
	1.192	5	5.00	6.00	**********	***
	1.310	4	4.00	10.00	********	*****
	1.428	1	1.00	11.00	**	*****
	1.546	5	5.00	16.00	**********	********
	1.665	4	4.00	20.00	********	**********
	1.783	8	8.00	28.00	**********	**********
	1.901	11	11.00	39.00	**********	**********
	2.019	13	13.00	52.00	**********	**********
	2.137	13	13.00	65.00	**********	**********
	2.256	8	8.00	73.00	**********	**********
	2.374	5	5.00	78.00	**********	**********
	2.492	6	6.00	84.00	**********	**********
	2.610	3	3.00	87.00	******	**********
	2.728	6	6.00	93.00	**********	**********
	2.847	2	2.00	95.00	****	**********
	2.965	2	2.00	97.00	****	**********
>	2.965	3	3.00	100.00	******	**********

SECTION 6 - TABLE OF CUMULATIVE FREQUENCY VALUES USED IN THE FOLLOWING GRAPH

DESCRIPTION OF THE VARIABLES

I - INDICE DEFINED BY THE PROGRAM;

X(I) - VARIABLE VALUE;

Y(I) - STANDARD (T) VARIABLE GIVEN BY THE EXPERIMENTAL CUMULATIVE FREQUENCY;

I	X(I)	Y(I)	I	X(I)	Y(I)	I	X(I)	Y(I)
1	1.177	-1.560	2	1.422	-1.230	3	1.528	-.995
4	1.681	-.807	5	1.763	-.644	6	1.826	-.498
7	1.864	-.360	8	1.906	-.228	9	1.967	-.101
10	2.013	.025	11	2.073	.151	12	2.106	.281
13	2.140	.413	14	2.218	.555	15	2.317	.710
16	2.410	.882	17	2.572	1.086	18	2.644	1.346
19	2.934	1.757						

CUMULATIVE FREQUENCY GRAPH

SECTION 7 - TEST FOR GOODNESS OF FIT BETWEEN EXPERIMENTAL AND THEORETICAL DISTRIBUTIONS

*** UNDEFINED ERROR (IER = *****) FROM IMSL ROUTINE GFIT

C H I - S Q U A R E T E S T

THE PROBABILITY OF THE CHI-SQUARE STATISTIC EXCEEDING 22.40000
WITH 15 DEGREE OF FREEDOM, IS 9.77366 PERCENT

ONE CAN REJECT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 9.77366 PERCENT PROBABILITY OF BEING INCORRECT

K O L M O G O R O V - S M I R N O V T E S T

THE PROBABILITY OF THE STATISTIC BEING GREATER THAN OR EQUAL TO .80626
IF THE HYPOTHESIS THAT X IS FROM THE DENSITY UNDER CONSIDERATION IS TRUE,
IS 53.39899 PERCENT

ONE CAN ACCEPT THE NULL HYPOTHESIS THAT THE SET X IS FROM THE DENSITY
UNDER CONSIDERATION WITH 53.39899 PERCENT PROBABILITY OF BEING CORRECT

D = .08063 K+= .08063 K-= .05379

THE PROBABILITY OF THE STATISTIC EXCEEDING .80626 ,IF THE HYPOTHESIS
OF EQUALITY IS TRUE AND THE ALTERNATIVE IS ONE SIDED , IS 27.25007 PERCENT

SECTION 8 - OPTIONS APPLIED FOR REGRESSION CASE (1)

CARD	OPTION		DESCRIPTION
10	NOINDW=	0	NUMBER OF INDEPENDANT VARIABLES TO BE EVENLY WEIGHTED;
	NOIND=	1	NUMBER OF INDEPENDANT VARIABLES;
	NV(1)= NL(1)= ND(1)=	2 0	OPTIONS ASSOCIATED WITH EACH INDEPENDANT VARIABLE; NV(I); INDICES OF RESPECTIVE INDEPENDANT VARIABLES; NL(I); LOGARITHMIC OPTIONS FOR RESPECTIVE INDEPENDANT VARIABLES; ND(I); EXPONENTS TO BE APPLIED TO EACH RESPECTIVE INDEPENDANT VARIABLE;
	L=	1	INDEX OF DEPENDANT VARIABLE;
	LOG2=		LOGARITHMIC OPTION FOR DEPENDANT VARIABLE;
12	TITLE=	**** REGRESSION THICK VERSUS GRADE ****	TITLE-HEADING FOR THIS REGRESSION;

SECTION 9 - REGRESSION STATISTICS CASE (1)

DEPENDENT VARIABLE NO. 1

TITLE = **** REGRESSION THICK VERSUS GRADE ***

DESCRIPTION OF THE VARIABLES

DFR - DEGREES OF FREEDOM FOR THE REGRESSION;
SSR - SUM OF SQUARES DUE TO REGRESSION;
MSR - REGRESSION MEAN SQUARE;
F - F-RATIO, USED TO TEST MSR FOR SIGNIFICANCE;
DFE - DEGREES OF FREEDOM FOR ERROR;
SSE - ERROR SUM OF SQUARES;
MSE - ERROR MEAN SQUARE;
DFT - TOTAL DEGREES OF FREEDOM;
SST - TOTAL SUM OF SQUARES OF DEPENDENT VARIABLE;
TOT - TOTAL PER-CENT VARIATION;
SED - STANDARD ERROR;

VARIABLE AVERAGE VALUE AND STANDARD DEVIATION

1	.8430911000E+01	.4305986638E+01
2	.8447927000E+01	.4252691832E+01

CORRELATION COEFFICIENT BETWEEN VARIABLES 1 AND
.8722463501E+00 --------- 2

REGRESSION STAGE 1 CONSTANT TERM = .1185113356E+01

VARIABLE	ORDER	REGRESSION COEFT	STANDARD ERROR OF COEFT	T-VALUE FOR COEFT=0	PROPORTION OF VARIATION
1	1	.8614506361E+00	.4879174515E-01	.1765566354E+02	.7608636953E+02

DFR	SSR	MSR	F	DFE	SSE
1	.1362201463E+04	.1362201463E+04	.3117224552E+03	98	.4282519310E+03

MSE	DFT	SST	TOT	SED
.4369917663E+01	99	.1790453394E+04	.7608000000E+02	.2090434802E+01

SECTION 10 - LIST OF INFORMATION FOR REGRESSION CASE (1)

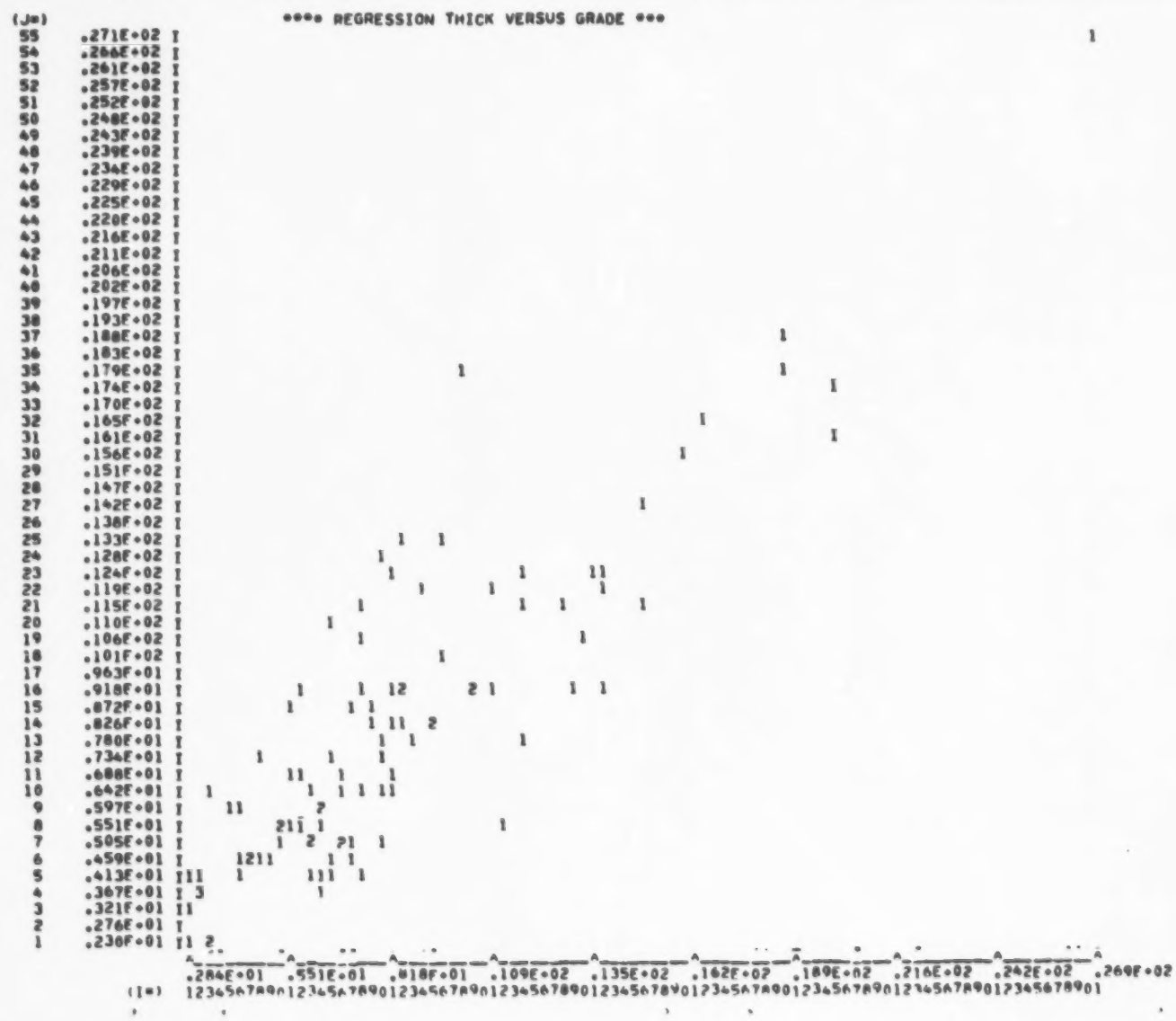
DESCRIPTION OF THE VARIABLES

NS - MEG SAMPLE NUMBER (DRILL HOLE NUMBER)!
IS - COMPANY SAMPLE NUMBER!
IRC - SAMPLE ROCK CODE!
CX - DEPARTURE OR X-COORDINATE OF SAMPLE!
CY - LATITUDE OR Y-COORDINATE OF SAMPLE!
CZ - ELEVATION OR Z-COORDINATE OF SAMPLE!

I - COLOMN OF FOLLOWING GRAPHIC!
J - LINE OF FOLLOWING GRAPHIC!
X - ABSCISSAS OF POINTS TO BE PLOTTED!
Y - ORDINATES OF POINTS TO BE PLOTTED!

NS	IS	IRC	I	J	CX	CY	CZ	X	Y
12			91	59	0.000	0.000	0.000	26.901	27.061
23			60	37	0.000	0.000	0.000	18.833	18.883
66			60	35	0.000	0.000	0.000	18.794	18.292
61			28	35	0.000	0.000	0.000	10.144	17.920
74			65	34	0.000	0.000	0.000	19.963	17.804
9			52	32	0.000	0.000	0.000	16.607	16.765
97			65	31	0.000	0.000	0.000	20.015	16.403
37			50	30	0.000	0.000	0.000	16.047	15.995
53			46	27	0.000	0.000	0.000	14.941	14.297
52			26	25	0.000	0.000	0.000	9.626	13.421
32			22	25	0.000	0.000	0.000	8.496	13.550
98			20	24	0.000	0.000	0.000	8.160	12.891
63			42	23	0.000	0.000	0.000	14.065	12.637
11			41	23	0.000	0.000	0.000	13.627	12.459
54			34	23	0.000	0.000	0.000	11.685	12.492
4			21	23	0.000	0.000	0.000	8.242	12.696
67			42	22	0.000	0.000	0.000	13.807	12.170
68			31	22	0.000	0.000	0.000	10.932	12.137
87			24	22	0.000	0.000	0.000	9.192	12.065
3			46	21	0.000	0.000	0.000	14.878	11.920
28			38	21	0.000	0.000	0.000	12.929	11.892
57			34	21	0.000	0.000	0.000	11.772	11.526
69			18	21	0.000	0.000	0.000	7.604	11.841
82			15	20	0.000	0.000	0.000	6.706	11.095
94			40	19	0.000	0.000	0.000	13.447	10.721
93			18	19	0.000	0.000	0.000	7.493	10.575
88			26	18	0.000	0.000	0.000	9.718	10.112
78			42	16	0.000	0.000	0.000	13.906	9.297
2			39	16	0.000	0.000	0.000	13.089	9.326
29			31	16	0.000	0.000	0.000	10.944	9.278
47			29	16	0.000	0.000	0.000	10.501	9.559
48			29	16	0.000	0.000	0.000	10.356	9.395
73			22	16	0.000	0.000	0.000	8.512	9.492
14			22	16	0.000	0.000	0.000	8.570	9.289
43			21	16	0.000	0.000	0.000	8.263	9.515
71			18	16	0.000	0.000	0.000	7.435	9.559
59			12	16	0.000	0.000	0.000	5.859	9.450
30			19	15	0.000	0.000	0.000	7.778	8.908
5			17	15	0.000	0.000	0.000	7.151	9.032
75			11	15	0.000	0.000	0.000	5.692	8.991
33			25	14	0.000	0.000	0.000	9.255	8.716
45			25	14	0.000	0.000	0.000	9.297	8.465
51			22	14	0.000	0.000	0.000	8.589	8.337
89			21	14	0.000	0.000	0.000	8.340	8.316
39			19	14	0.000	0.000	0.000	7.837	8.348
84			34	13	0.000	0.000	0.000	11.886	8.089
7			23	13	0.000	0.000	0.000	8.916	7.873
18			20	13	0.000	0.000	0.000	8.059	7.859
79			20	12	0.000	0.000	0.000	8.072	7.737
76			15	12	0.000	0.000	0.000	6.726	7.675
19			8	12	0.000	0.000	0.000	4.830	7.398
8			21	11	0.000	0.000	0.000	8.243	7.084
10			16	11	0.000	0.000	0.000	6.868	7.212
22			12	11	0.000	0.000	0.000	5.831	7.100
36			11	11	0.000	0.000	0.000	5.777	7.023
24			21	10	0.000	0.000	0.000	8.216	6.718
27			20	10	0.000	0.000	0.000	7.946	6.456
15			18	10	0.000	0.000	0.000	7.484	6.574
42			16	10	0.000	0.000	0.000	7.046	6.573

SECTION 11 - GRAPHIC OF EXPERIMENTAL VALUES OF DEPENDANT VARIABLE (Y) VERSUS FIRST INDEPENDANT VARIABLE (X)



IF USE OF PROGRAM MEG2530 IS REQUIRED TO PLOT A SCATTERGRAM, THE INTEGER 100 MUST BE PLACED IN THE FIRST FIVE COLUMNS OF FORMAT CARD.

SECTION 8 - OPTIONS APPLIED FOR REGRESSION CASE (2)

CARD	OPTION		DESCRIPTION
10	NOINDW=	0	NUMBER OF INDEPENDANT VARIABLES TO BE EVENLY WEIGHTED:
	NOIND=	1	NUMBER OF INDEPENDANT VARIABLES:
	NV(1)=	2	
	NL(1)=	L	
	ND(1)=	0	OPTIONS ASSOCIATED WITH EACH INDEPENDANT VARIABLE: NV(I): INDICES OF RESPECTIVE INDEPENDANT VARIABLES: NL(I): LOGARITHMIC OPTIONS FOR RESPECTIVE INDEPENDANT VARIABLES: ND(I): EXPONENTS TO BE APPLIED TO EACH RESPECTIVE INDEPENDANT VARIABLE:
	L=	1	INDEX OF DEPENDANT VARIABLE:
	LOG2=		LOGARITHMIC OPTION FOR DEPENDANT VARIABLE:
12	TITLE=	**** REGRESSION THICK(LOG) VERSUS GRADE ****	TITLE-HEADING FOR THIS REGRESSION:

SECTION 9 - REGRESSION STATISTICS CASE (2)

DEPENDENT VARIABLE NO. 1

TITLE = **** REGRESSION THICK(LOG) VERSUS GRADE ****

DESCRIPTION OF THE VARIABLES

DFR - DEGREES OF FREEDOM FOR THE REGRESSION;
SSR - SUM OF SQUARES DUE TO REGRESSION;
MSR - REGRESSION MEAN SQUARE;
F - F-RATIO, USED TO TEST MSR FOR SIGNIFICANCE;
DFE - DEGREES OF FREEDOM FOR ERROR;
SSE - ERROR SUM OF SQUARES;
MSE - ERROR MEAN SQUARE;
DFT - TOTAL DEGREES OF FREEDOM;
SST - TOTAL SUM OF SQUARES OF DEPENDENT VARIABLE;
TOT - TOTAL PER-CENT VARIATION;
SED - STANDARD ERROR;

VARIABLE AVERAGE VALUE AND STANDARD DEVIATION

1	.2019175313E+01	.4728168839E+00
2	.8447927000E+01	.4252691832E+01

CORRELATION COEFFICIENT BETWEEN VARIABLES 1 AND
.8246200870E+00 --------- 2

REGRESSION STAGE 1 CONSTANT TERM = -.6528177915E+01

VARIABLE	ORDER	REGRESSION COEFT	STANDARD ERROR OF COEFT	T-VALUE FOR COEFT=0	PROPORTION OF VARIATION
1	1	.7416941373E+01	.5139655967E+00	.1443081292E+02	.6800482879E+02

DFR	SSR	MSR	F	DFE	SSE
1	.1217505242E+04	.1217505242E+04	.2082483615E+03	98	.5729481514E+03

MSE	DFT	SST	TOT	SED
.5846409708E+01	99	.1790453394E+04	.6800000000E+02	.2417935009E+01

SECTION 10 - LIST OF INFORMATION FOR REGRESSION CASE (2)

DESCRIPTION OF THE VARIABLES

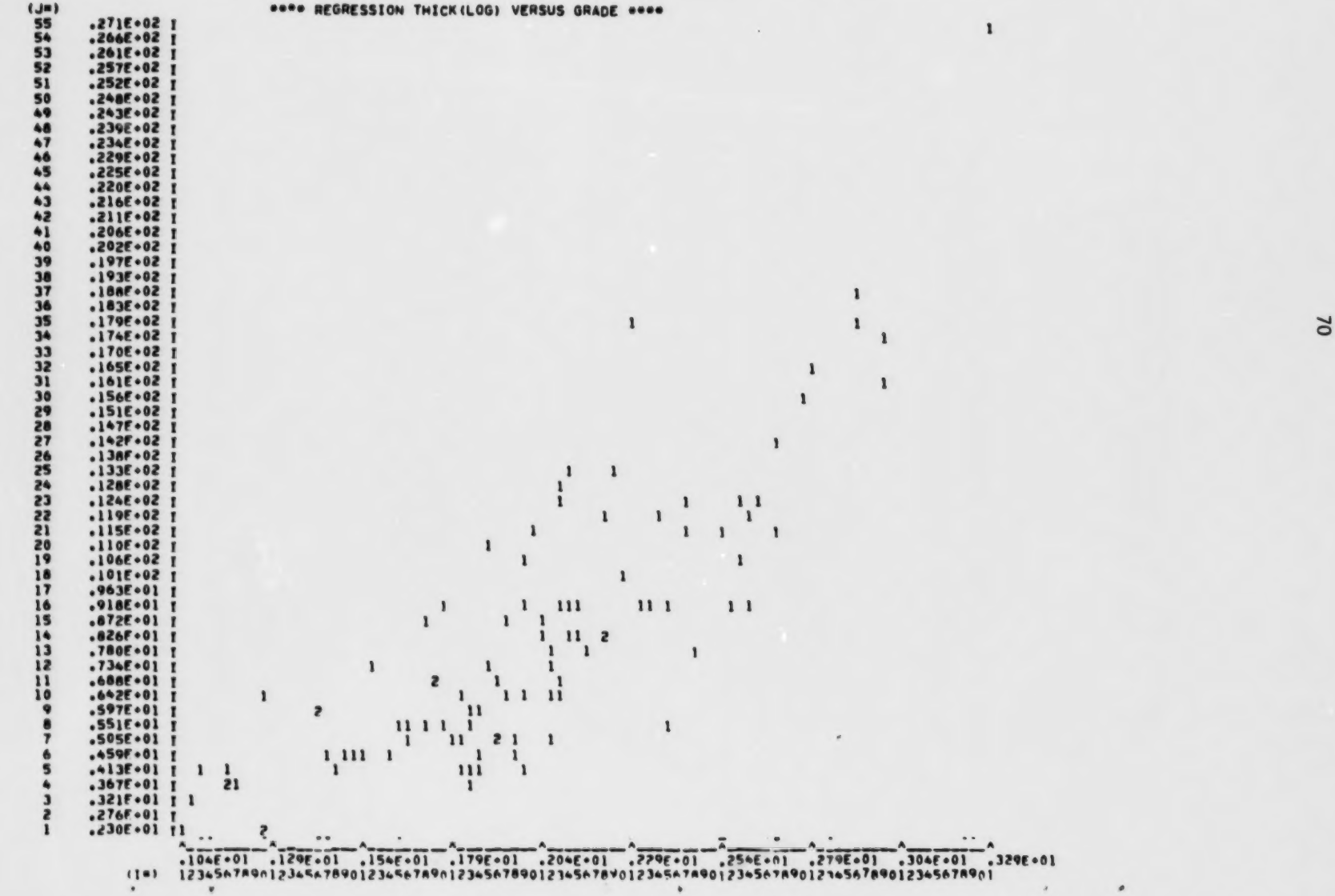
NS - MEG SAMPLE NUMBER (DRILL HOLE NUMBER)!
IS - COMPANY SAMPLE NUMBER!
IRC - SAMPLE ROCK CODE!
CX - DEPARTURE OR X-COORDINATE OF SAMPLE!
CY - LATITUDE OR Y-COORDINATE OF SAMPLE!
CZ - ELEVATION OR Z-COORDINATE OF SAMPLE!

I - COLOMN OF FOLLOWING GRAPHIC!
J - LINE OF FOLLOWING GRAPHIC!
X - ABSCISSAS OF POINTS TO BE PLOTTED!
Y - ORDINATES OF POINTS TO BE PLOTTED!

NS	IS	INC	I	J	CX	CY	CZ	X	Y
12			91	56	0.000	0.000	0.000	3.292	27.061
23			76	37	0.000	0.000	0.000	2.936	18.663
66			76	35	0.000	0.000	0.000	2.934	18.292
61			51	35	0.000	0.000	0.000	2.317	17.920
74			79	34	0.000	0.000	0.000	2.994	17.804
9			71	32	0.000	0.000	0.000	2.810	17.804
97			79	31	0.000	0.000	0.000	2.996	16.765
37			70	30	0.000	0.000	0.000	2.776	16.403
53			67	27	0.000	0.000	0.000	2.704	15.995
52			49	25	0.000	0.000	0.000	2.264	14.297
32			44	25	0.000	0.000	0.000	2.140	13.421
98			43	24	0.000	0.000	0.000	2.099	13.550
63			65	23	0.000	0.000	0.000	2.644	12.891
11			63	23	0.000	0.000	0.000	2.612	12.617
54			57	23	0.000	0.000	0.000	2.458	12.459
47			43	22	0.000	0.000	0.000	2.109	12.422
67			64	22	0.000	0.000	0.000	2.625	12.696
68			54	22	0.000	0.000	0.000	2.392	12.170
87			48	21	0.000	0.000	0.000	2.218	12.137
3			67	21	0.000	0.000	0.000	2.700	12.065
28			61	21	0.000	0.000	0.000	2.559	11.920
57			57	21	0.000	0.000	0.000	2.466	11.852
69			40	21	0.000	0.000	0.000	2.029	11.526
82			35	20	0.000	0.000	0.000	1.903	11.441
94			63	19	0.000	0.000	0.000	2.599	11.095
93			39	19	0.000	0.000	0.000	2.014	10.721
80			50	18	0.000	0.000	0.000	2.274	10.575
70			64	16	0.000	0.000	0.000	2.632	10.112
2			62	16	0.000	0.000	0.000	2.572	9.297
29			55	16	0.000	0.000	0.000	2.303	9.326
47			53	16	0.000	0.000	0.000	2.352	9.278
46			52	16	0.000	0.000	0.000	2.338	9.559
14			45	16	0.000	0.000	0.000	2.148	9.395
73			44	16	0.000	0.000	0.000	2.142	9.289
43			43	16	0.000	0.000	0.000	2.112	9.452
71			39	16	0.000	0.000	0.000	2.006	9.515
59			30	16	0.000	0.000	0.000	1.768	9.559
30			41	15	0.000	0.000	0.000	2.051	9.450
5			37	15	0.000	0.000	0.000	1.967	8.908
75			28	15	0.000	0.000	0.000	1.739	9.032
33			48	14	0.000	0.000	0.000	2.225	8.991
45			48	14	0.000	0.000	0.000	2.230	8.716
51			45	14	0.000	0.000	0.000	2.150	8.445
89			44	14	0.000	0.000	0.000	2.121	8.337
39			41	14	0.000	0.000	0.000	2.059	8.316
64			58	13	0.000	0.000	0.000	2.475	8.348
7			46	13	0.000	0.000	0.000	2.188	8.069
18			42	13	0.000	0.000	0.000	2.087	7.873
79			42	12	0.000	0.000	0.000	2.088	7.859
76			35	12	0.000	0.000	0.000	1.906	7.737
19			22	12	0.000	0.000	0.000	1.575	7.475
6			43	11	0.000	0.000	0.000	2.109	7.358
10			36	11	0.000	0.000	0.000	1.927	7.084
36			29	11	0.000	0.000	0.000	1.754	7.212
22			29	11	0.000	0.000	0.000	1.763	7.023
24			43	10	0.000	0.000	0.000	2.106	7.100
27			42	10	0.000	0.000	0.000	2.073	6.718
15			39	10	0.000	0.000	0.000	2.013	6.456
42			27	10	0.000	0.000	0.000	1.945	6.574
									6.573

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	34	9	0.000	0.000	0.000	1.884	5.995
38	33	9	0.000	0.000	0.000	1.858	6.147
85	16	9	0.000	0.000	0.000	1.437	5.967
1	16	9	0.000	0.000	0.000	1.422	6.336
60	55	8	0.000	0.000	0.000	2.410	5.750
58	33	8	0.000	0.000	0.000	1.862	5.680
50	30	8	0.000	0.000	0.000	1.777	5.515
99	28	8	0.000	0.000	0.000	1.729	5.629
46	26	8	0.000	0.000	0.000	1.681	5.692
49	25	8	0.000	0.000	0.000	1.660	5.716
81	42	7	0.000	0.000	0.000	2.085	5.278
92	38	7	0.000	0.000	0.000	1.977	5.487
31	36	7	0.000	0.000	0.000	1.929	5.506
35	36	7	0.000	0.000	0.000	1.932	5.061
100	32	7	0.000	0.000	0.000	1.830	5.090
56	31	7	0.000	0.000	0.000	1.816	5.379
88	26	7	0.000	0.000	0.000	1.686	5.197
65	38	6	0.000	0.000	0.000	1.972	4.860
86	34	6	0.000	0.000	0.000	1.887	4.856
90	24	6	0.000	0.000	0.000	1.620	4.905
83	21	6	0.000	0.000	0.000	1.554	4.974
34	20	6	0.000	0.000	0.000	1.520	4.977
25	19	6	0.000	0.000	0.000	1.508	4.665
13	17	6	0.000	0.000	0.000	1.449	4.797
62	39	5	0.000	0.000	0.000	2.009	4.418
72	34	5	0.000	0.000	0.000	1.885	4.450
78	33	5	0.000	0.000	0.000	1.864	4.543
41	32	5	0.000	0.000	0.000	1.826	4.421
77	18	5	0.000	0.000	0.000	1.472	4.551
26	6	5	0.000	0.000	0.000	1.175	4.237
16	3	5	0.000	0.000	0.000	1.114	4.488
96	33	4	0.000	0.000	0.000	1.862	4.054
44	7	4	0.000	0.000	0.000	1.214	3.992
91	6	4	0.000	0.000	0.000	1.171	3.850
95	6	4	0.000	0.000	0.000	1.177	4.033
20	2	3	0.000	0.000	0.000	1.080	3.450
21	10	1	0.000	0.000	0.000	1.285	2.338
17	10	1	0.000	0.000	0.000	1.278	2.297
40	1	1	0.000	0.000	0.000	1.043	2.677

SECTION 11 - GRAPHIC OF EXPERIMENTAL VALUES OF DEPENDANT VARIABLE (Y) VERSUS FIRST INDEPENDANT VARIABLE (X)



IF USE OF PROGRAM MEG2530 IS REQUIRED TO PLOT A SCATTERGRAM, THE INTEGER 100
MUST BE PLACED IN THE FIRST FIVE COLUMNS OF FORMAT CARD.

SECTION 8 - OPTIONS APPLIED FOR REGRESSION CASE (3)

CARD	OPTION		DESCRIPTION
10	NOINDW=	0	NUMBER OF INDEPENDANT VARIABLES TO BE EVENLY WEIGHTED;
	NOIND=	1	NUMBER OF INDEPENDANT VARIABLES;
	NV(1)=	2	OPTIONS ASSOCIATED WITH EACH INDEPENDANT VARIABLE;
	NL(1)=		NV(I); INDICES OF RESPECTIVE INDEPENDANT VARIABLES;
	ND(1)=	0	NL(I); LOGARITHMIC OPTIONS FOR RESPECTIVE INDEPENDANT VARIABLES;
			ND(I); EXPONENTS TO BE APPLIED TO EACH RESPECTIVE INDEPENDANT VARIABLE;
	L=	1	INDEX OF DEPENDANT VARIABLE;
	LOG2=	L	LOGARITHMIC OPTION FOR DEPENDANT VARIABLE;
12	TITLE=	**** REGRESSION THICK VERSUS GRADE(LOG) ****	TITLE-HEADING FOR THIS REGRESSION;

SECTION 9 - REGRESSION STATISTICS CASE (3)

DEPENDENT VARIABLE NO. 1

TITLE = **** REGRESSION THICK VERSUS GRADE(LOG) ****

DESCRIPTION OF THE VARIABLES

DFR - DEGREES OF FREEDOM FOR THE REGRESSION;
SSR - SUM OF SQUARES DUE TO REGRESSION;
MSR - REGRESSION MEAN SQUARE;
F - F-RATIO, USED TO TEST MSR FOR SIGNIFICANCE;
DFE - DEGREES OF FREEDOM FOR ERROR;
SSE - ERROR SUM OF SQUARES;
MSE - ERROR MEAN SQUARE;
DFT - TOTAL DEGREES OF FREEDOM;
SST - TOTAL SUM OF SQUARES OF DEPENDENT VARIABLE;
TOT - TOTAL PER-CENT VARIATION;
SED - STANDARD ERROR;

VARIABLE AVERAGE VALUE AND STANDARD DEVIATION

1	.8430911000E+01	.4305986638E+01
2	.2020270086E+01	.4785135770E+00

CORRELATION COEFFICIENT BETWEEN VARIABLES 1 AND
.8142198633E+00 --------- 2

REGRESSION STAGE 1 CONSTANT TERM = .1257422486E+01

VARIABLE	ORDER	REGRESSION COEFT	STANDARD ERROR OF COEFT	T-VALUE FOR COEFT=0	PROPORTION OF VARIATION
1	1	.9048222674E-01	.6517081420E-02	.1388385704E+02	.6630039859E+02

DFR	SSR	MSR	F	DFE	SSE
1	.1502820498E+02	.1502820498E+02	.1927614862E+03	98	.7440344120E+01

MSE	DFT	SST	TOT	SED
.7796269510E-01	99	.2266854910E+02	.6630000000E+02	.2792180064E+00

SECTION 10 - LIST OF INFORMATION FOR REGRESSION CASE (3)

DESCRIPTION OF THE VARIABLES

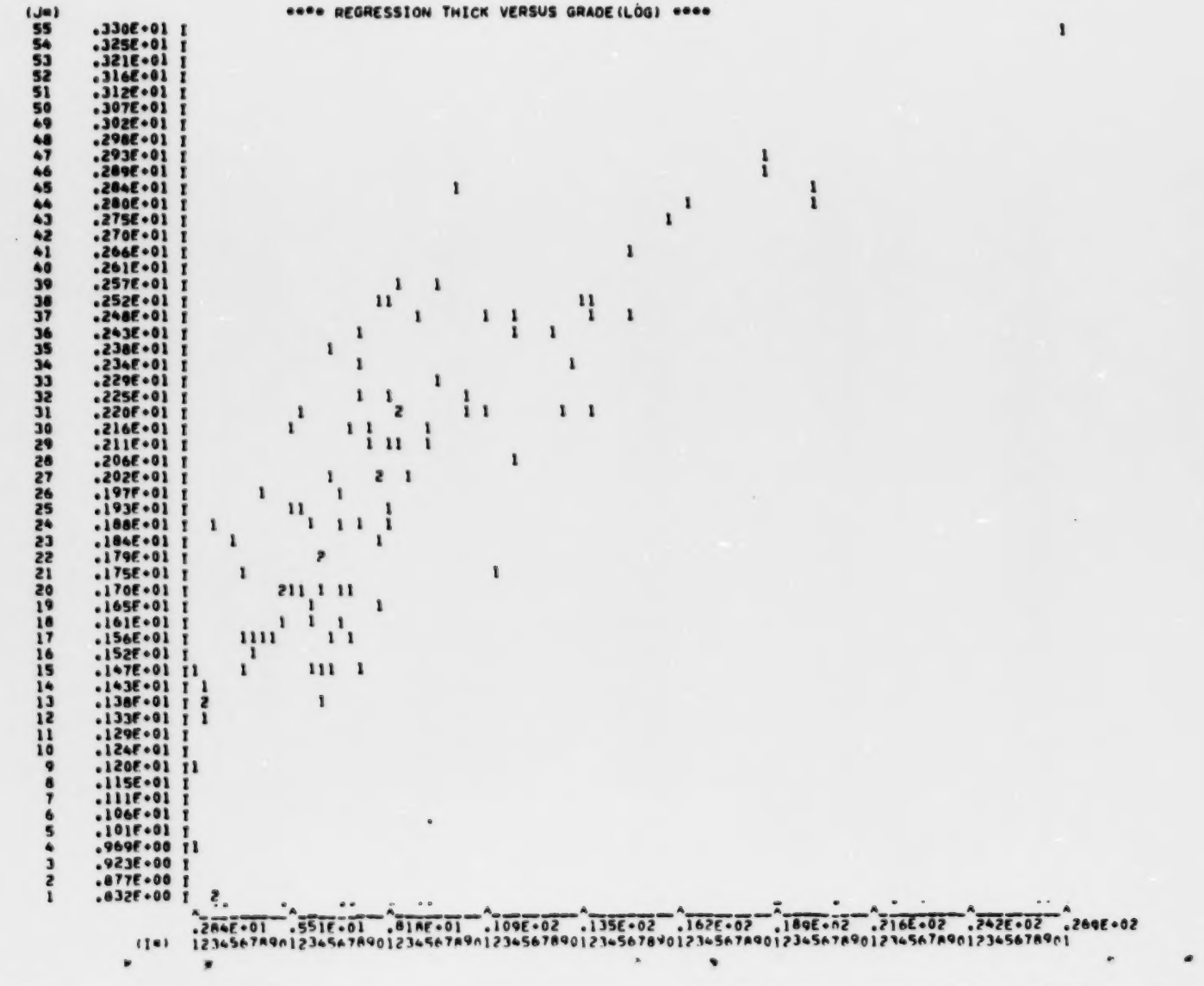
NS - MEG SAMPLE NUMBER (DRILL HOLE NUMBER)!
IS - COMPANY SAMPLE NUMBER!
IRC - SAMPLE ROCK CODE!
CX - DEPARTURE OR X-COORDINATE OF SAMPLE!
CY - LATITUDE OR Y-COORDINATE OF SAMPLE!
CZ - ELEVATION OR Z-COORDINATE OF SAMPLE!

I - COLOMN OF FOLLOWING GRAPHIC!
J - LINE OF FOLLOWING GRAPHIC!
X - ABSCISSAS OF POINTS TO BE PLOTTED!
Y - ORDINATES OF POINTS TO BE PLOTTED!

NS	IS	IMC	I	J	CX	CY	CZ	X	Y
12			91	55	0.000	0.000	0.000	26.901	3.298
23			60	47	0.000	0.000	0.000	18.833	2.938
66			60	46	0.000	0.000	0.000	18.794	2.906
74			65	45	0.000	0.000	0.000	19.963	2.879
61			28	45	0.000	0.000	0.000	10.144	2.886
97			65	44	0.000	0.000	0.000	20.015	2.797
9			52	44	0.000	0.000	0.000	16.607	2.819
37			50	43	0.000	0.000	0.000	16.047	2.772
53			46	41	0.000	0.000	0.000	14.941	2.660
52			26	39	0.000	0.000	0.000	9.626	2.597
32			22	39	0.000	0.000	0.000	8.496	2.606
63			42	38	0.000	0.000	0.000	14.065	2.537
11			41	38	0.000	0.000	0.000	13.627	2.522
4			21	38	0.000	0.000	0.000	8.242	2.541
98			20	38	0.000	0.000	0.000	8.160	2.556
3			46	37	0.000	0.000	0.000	14.878	2.478
67			42	37	0.000	0.000	0.000	13.807	2.499
54			34	37	0.000	0.000	0.000	11.685	2.520
68			31	37	0.000	0.000	0.000	10.932	2.496
87			24	37	0.000	0.000	0.000	9.192	2.490
28			38	36	0.000	0.000	0.000	12.929	2.473
57			34	36	0.000	0.000	0.000	11.772	2.445
69			18	36	0.000	0.000	0.000	7.604	2.472
82			15	35	0.000	0.000	0.000	6.706	2.406
94			40	34	0.000	0.000	0.000	13.447	2.372
93			18	34	0.000	0.000	0.000	7.493	2.358
80			26	33	0.000	0.000	0.000	9.718	2.314
47			29	32	0.000	0.000	0.000	10.501	2.258
43			21	32	0.000	0.000	0.000	8.263	2.253
71			18	32	0.000	0.000	0.000	7.435	2.257
70			42	31	0.000	0.000	0.000	13.906	2.230
2			39	31	0.000	0.000	0.000	13.089	2.233
29			31	31	0.000	0.000	0.000	10.944	2.228
48			29	31	0.000	0.000	0.000	10.356	2.240
73			22	31	0.000	0.000	0.000	8.512	2.246
14			22	31	0.000	0.000	0.000	8.570	2.229
59			12	31	0.000	0.000	0.000	5.859	2.246
33			25	30	0.000	0.000	0.000	9.255	2.165
30			19	30	0.000	0.000	0.000	7.778	2.187
5			17	30	0.000	0.000	0.000	7.151	2.201
75			11	30	0.000	0.000	0.000	5.692	2.196
45			25	29	0.000	0.000	0.000	9.297	2.136
51			22	29	0.000	0.000	0.000	8.589	2.121
89			21	29	0.000	0.000	0.000	8.340	2.118
39			19	29	0.000	0.000	0.000	7.837	2.122
84			34	28	0.000	0.000	0.000	11.886	2.081
7			23	27	0.000	0.000	0.000	8.916	2.063
79			20	27	0.000	0.000	0.000	8.072	2.046
18			20	27	0.000	0.000	0.000	8.059	2.062
76			15	27	0.000	0.000	0.000	6.726	2.038
10			16	26	0.000	0.000	0.000	6.868	1.976
19			8	26	0.000	0.000	0.000	4.830	1.996
8			21	25	0.000	0.000	0.000	8.243	1.958
22			12	25	0.000	0.000	0.000	5.831	1.960
36			11	25	0.000	0.000	0.000	5.777	1.949
24			21	24	0.000	0.000	0.000	8.216	1.905
15			18	24	0.000	0.000	0.000	7.484	1.883
42			16	24	0.000	0.000	0.000	7.066	1.883
55			13	24	0.000	0.000	0.000	6.172	1.899

27	20	23	0.000	0.000	0.000	7.948	1.885
1	5	23	0.000	0.000	0.000	4.144	1.846
38	14	22	0.000	0.000	0.000	6.409	1.816
6	14	22	0.000	0.000	0.000	6.577	1.791
60	32	21	0.000	0.000	0.000	11.132	1.749
85	6	21	0.000	0.000	0.000	4.210	1.786
92	17	20	0.000	0.000	0.000	7.225	1.702
31	16	20	0.000	0.000	0.000	6.883	1.706
58	14	20	0.000	0.000	0.000	6.434	1.737
50	12	20	0.000	0.000	0.000	5.913	1.707
99	11	20	0.000	0.000	0.000	5.636	1.728
46	10	20	0.000	0.000	0.000	5.371	1.739
49	10	20	0.000	0.000	0.000	5.257	1.743
81	20	19	0.000	0.000	0.000	8.046	1.663
56	13	19	0.000	0.000	0.000	6.148	1.683
35	16	18	0.000	0.000	0.000	6.902	1.622
100	13	18	0.000	0.000	0.000	6.233	1.627
88	10	18	0.000	0.000	0.000	5.398	1.648
65	17	17	0.000	0.000	0.000	7.182	1.581
86	15	17	0.000	0.000	0.000	6.601	1.580
90	9	17	0.000	0.000	0.000	5.054	1.590
83	8	17	0.000	0.000	0.000	4.732	1.604
34	7	17	0.000	0.000	0.000	4.574	1.605
13	6	17	0.000	0.000	0.000	4.259	1.568
25	7	16	0.000	0.000	0.000	4.517	1.540
62	18	15	0.000	0.000	0.000	7.455	1.486
72	15	15	0.000	0.000	0.000	6.589	1.493
78	14	15	0.000	0.000	0.000	6.451	1.514
41	13	15	0.000	0.000	0.000	6.210	1.486
77	6	15	0.000	0.000	0.000	4.359	1.515
16	1	15	0.000	0.000	0.000	3.046	1.501
26	2	14	0.000	0.000	0.000	3.239	1.444
96	14	13	0.000	0.000	0.000	6.434	1.400
44	2	13	0.000	0.000	0.000	3.366	1.384
95	2	13	0.000	0.000	0.000	3.244	1.394
91	2	12	0.000	0.000	0.000	3.226	1.348
20	1	9	0.000	0.000	0.000	2.945	1.238
40	1	4	0.000	0.000	0.000	2.837	.985
21	3	1	0.000	0.000	0.000	3.616	.849
17	3	1	0.000	0.000	0.000	3.589	.832

SECTION 11 - GRAPHIC OF EXPERIMENTAL VALUES OF DEPENDANT VARIABLE (Y) VERSUS FIRST INDEPENDANT VARIABLE (X)



IF USE OF PROGRAM MEG2530 IS REQUIRED TO PLOT A SCATTERGRAM, THE INTEGER 100
MUST BE PLACED IN THE FIRST FIVE COLUMNS OF FORMAT CARD.

REFERENCES

1. Sabourin, R.L., "Program MEG2010 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-102(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

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Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

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Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
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1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

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PROGRAM MEG2200 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal reporting purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

Ce document est un rapport préliminaire non-révisé et rédigé principalement pour fin de discussion et de documentation interne. Il ne constitue nullement une expression définitive de l'opinion du Centre canadien de la technologie des minéraux et de l'énergie (CANMET)

36 pp

ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

DIVISION REPORT ERP/MRL 82-108(TR)

PROGRAM MEG2200 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2200 is to compute experimental variograms of a variable using angular regularizations. The directions along which variograms are computed and the sector openings associated with each direction can either be specified by the user or automatically determined by MEG2200. However, distance classes for each directions are specified by the user. Relative as well as logarithmic variograms are optionnally calculated. MEG2200 can compute variograms in two-dimension, three-dimension or along drillholes. A proportionnal effect study can also be performed by the program.

The input file of MEG2200 is provided by MEG2010, MEG2040 or by the user, the output results of MEG2200 can be stored on a file so that the experimental variograms can be graphically displayed on a calcomp plotter or so that it can be used as the input file of MEG2275 which will find the best theoretical variogram model.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2200 SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2200 est de calculer les variogrammes expérimentaux d'une variable en utilisant des régularisations angulaires. Les directions le long desquelles les variogrammes sont calculés ainsi que les ouvertures des secteurs associés à chaque direction peuvent être spécifiées par l'utilisateur ou automatiquement déterminées par MEG2200. Par contre, les classes de distances pour chaque direction sont données par l'utilisateur. Des variogrammes relatifs ou logarithmiques peuvent optionnellement être calculés. MEG2200 peut calculer des variogrammes en deux ou en trois dimensions ainsi que le long des sondages. Une étude de l'effet proportionnel peut aussi être fournie par le programme.

Le fichier d'entrée de MEG2200 est fourni par MEG2010, MEG2040 ou par l'utilisateur. Les résultats de sortie de MEG2200 peuvent être enregistrés sur un fichier pour que les variogrammes expérimentaux soient dessinés à l'aide d'un traceur Calcomp ou pour qu'ils soient utilisés comme fichier d'entrée du programme MEG2275 qui trouvera le meilleur modèle théorique de variogramme.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2200(X,Y,Z,V,KN,
     -                   DISTOT,EFF,S1,S2,S3,SS3,AMOY,XG,YG,
     -                   ZG,WG,IGA,IGB,BMOY,VMOY,NMOY,GRADLC,
     -                   VECTLG,NMOYA,IIIX,JJJY,KKKZ,
     -                   K1,K3,K4,K5,K6,K7,K8,K9,K10,K12,K13,K14)
C*
C*
C*************************************************************************
C*                                                                       *
C*                                                                       *
C******GENERAL DESCRIPTION                                               *
C*                                                                       *
C*     MAIN SUBROUTINE IS CALLED BY GEM2200 WHERE ARRAY DIMENSIONS       *
C*     ARE DEFINED.                                                      *
C*     MEG2200 COMPUTES EXPERIMENTAL VARIOGRAMS OF A VARIABLE USING      *
C*     ANGULAR REGULARIZATIONS. THE USER PROVIDES THE DIRECTIONS ALONG   *
C*     WHICH VARIOGRAMS ARE COMPUTED AND THE SECTOR OPENINGS ASSOCIATED  *
C*     WITH EACH DIRECTION. DEFAULT DIRECTIONS TO COVER THE ENTIRE       *
C*     SPACE ARE OPTIONAL.                                               *
C*     DISTANCE CLASSES CORRESPONDING TO EACH DIRECTION                  *
C*     ARE SPECIFIED BY USER.  THE FIRST CLASS OF EACH DIRECTION IS      *
C*     HALF THE CLASS DISTANCE FOR THAT DIRECTION. RELATIVE AS WELL AS   *
C*     LOGARITHMIC VARIOGRAMS ARE OPTIONNALLY CALCULATED. MEG2200 COM-   *
C*     PUTES VARIOGRAMS IN 2-D, 3-D OR ALONG DRILL-HOLES.                *
C*     RECTANGULAR REGIONS CAN ALSO BE SELECTED FOR A SPECIAL STUDY.     *
C*     SAMPLE DATA ARE READ IN FROM TAPE 6 (NORMALLY INPUT DATA WILL     *
C*     COME FROM MEG2010) WHEREAS USER OPTIONS ARE READ ON DATA CARDS.   *
C*     EXPERIMENTAL VARIOGRAM VALUES ARE PRINTED ON TAPE 7 DISK FILE IN  *
C*     FORMATS THAT ARE COMPATIBLE WITH READING STATEMENTS OF PROGRAM     *
C*     MEG2275.                                                          *
C*     PROGRAM MEG2200 HAS BEEN WRITTEN IN CDC FORTRAN LEVEL 4.8 AND     *
C*     WAS CREATED BY RAYMOND SABOURIN (EMR, CANMET, MRL), MAY 1982.     *
C*                                                                       *
C*************************************************************************
C*                                                                       *
C*                                                                       *
C*************************************************************************
C*                                                                       *
C*                                                                       *
C******OPTIONS READ ON INPUT                                             *
C*                                                                       *
C*    CARD 1 - ICOM                                                      *
C*             FORMAT READ IS (8A10)                                     *
C*         ICOM     - GENERAL TITLE                                      *
C*                                                                       *
C*     CARD 2 - IS,ILOG,IDIR,IR,IREL,ISORT,LOGGR,INTER,ISTOP,IBIG,INDC,  *
C*              ISAME,IDR,IDEF                                           *
C*              FORMAT READ IS (12I1,I2,A10)                             *
C*          IS     - THREE POSSIBLE VALUES (SEE CORRESPONDING STEPZ      *
C*                   OPTIONS):                                           *
C*                   IS=1 VARIOGRAM IS CALCULATED ALONG DRILL HOLES,     *
C*                        THREE DIMENSIONAL COORDINATES ARE USED!        *
C*                   IS=2 VARIOGRAM IN TWO DIMENSIONS!                   *
C*                        IF(STEPZ.LT.0.0) X,Y COORDINATES ARE USED      *
C*                        WITH Z SET TO ZERO.Z MUST BE SPECIFIED IN THE  *
C*                        FORMAT FMT (SEE CARD 9)                        *
C*                        IF(STEPZ.GT.0.0) THREE DIMENSIONAL             *
```

```
C*                    COORDINATES ARE USED. THE SECTORS DIRECTIONS
C*                    AND OPENINGS ARE DEFINED IN TWO-DIMENSIONS,
C*                    HAVING AN EQUAL THICKNESS OF STEPZ.
C*                 IS=3 VARIOGRAM IN THREE DIMENSIONS USING (X,Y,Z)
C*                    COORDINATES. THE SECTORS ARE ORIENTED IN ALL
C*                    3-D DIRECTIONS. FOR IS=2 AND STEPZ.LT.0.0 THE
C*                    VARIABLE IS STRICKLY TWO-DIMENSIONAL. FOR THE
C*                    OTHER CASES, THE VARIABLE IS THREE DIMENSIONAL
C*                    AND THE SAMPLES ARE OF EQUAL LENGTH.
C*           ILOG   - TWO POSSIBILITIES:
C*                    ILOG=1, LOGARITHMIC VARIOGRAMS ARE CALCULATED
C*                    ILOG=0 VARIABLE VALUES ARE NOT TRANSFORMED:
C*           IDIR   - NUMBER OF DIRECTIONS TO BE STUDIED.
C*                    WHEN IDIR.NE.0 THE USER SPECIFIES IDIR SECTORS
C*                    DIRECTIONS AND OPENINGS. THESE SECTORS MAY OVERLAP
C*                    ONE ANOTHER.
C*                    IF THE SECTORS ARE DISJOINT BUT DO NOT COVER THE
C*                    ENTIRE SPACE, THE USER MUST USE A 180 DEGREE
C*                    OPENING FOR THE FIRST SECTOR WHEN AN AVERAGE
C*                    VARIOGRAM IS DESIRED.
C*                    WHEN IDIR=0, IDIR WILL BE REDEFINED ACCORDING TO
C*                    TWO POSSIBLE DEFAULT VALUES.
C*                    HALF THE TOTAL OPENING FOR EACH DIRECTION IS
C*                    AUTOMATICALLY SET TO 22.5 DEGREES FOR ALL BUT THE
C*                    FIRST DIRECTION, IN WHICH CASE THE TOTAL OPENING
C*                    IS 180 DEGREES (AVERAGE VARIOGRAM):
C*                    IF IS=1:  IDIR IS SET TO FOURTEEN DIRECTIONS:
C*                    IF IS=2:  IDIR IS SET TO FIVE DIRECTIONS:
C*                    IF IS=3:  IDIR IS SET TO FOURTEEN DIRECTIONS:
C*                    IN EACH CASE, THE FIRST DIRECTION CORRESPONDS TO
C*                    THE AVERAGE VARIOGRAM.  THE OTHER DIRECTIONS ARE
C*                    ASSOCIATED WITH IDIR-1 (DISJOINT) DIRECTIONS.
C*                    THESE DIRECTIONS ARE DEFINED BY THE FOLLOWING PHIXY
C*                    VALUES (PHIYZ VALUES ARE SET TO ZERO).
C*                    IS=2:  IDIR=2, 0 DEGREES (FROM X-AXIS)
C*                              3, 45 DEGREES (FROM X-AXIS)
C*                              4, 90 DEGREES (FROM X-AXIS)
C*                              5, 135 DEGREES (FROM X-AXIS)
C*                    (EACH ANGLE IS ASSOCIATED WITH A DIRECTION CHOSEN
C*                    WITH RESPECT TO THE X-AXIS)
C*                    FOR IS=3 PHIXY AND PHIYZ ARE SET TO THE FOLLOWING
C*                    VALUES
C*                       IDIR=2, (0,0)
C*                            3, (0,45)
C*                            4, (0,135)
C*                            5, (45,0)
C*                            6, (45,45)
C*                            7, (45,135)
C*                            8, (90,0)
C*                            9, (90,45)
C*                            10, (90,135)
C*                            11, (135,0)
C*                            12, (135,45)
C*                            13, (135,135)
C*                            14, (0,90)
C*                    (EACH PAIR OF ANGLES CORRESPONDS TO ROTATIONS
C*                    FIRST IN THE X/Y PLANE AND THEN IN THE Y/Z ROTATED
```

```
C*                 PLANE);                                                *
C*                 IDIR DISTANCE CLASSES MUST BE SPECIFIED (SEE OPTION*
C*                 CARD 5);                                               *
C*        IR     - NUMBER OF REGIONS (PARALELEPIPED) STUDIED; IR MUST *
C*                 BE AT LEAST EQUAL TO ONE. IR CARDS 7 WILL CONTAIN  *
C*                 COORDINATE DELIMITATIONS FOR IR REGIONS;           *
C*        IREL   - TYPE OF RELATIVE VARIOGRAM REQUIRED;                *
C*                 WHEN IREL=0, THE AVERAGE OF PAIRED MEANS (AVE) FOR *
C*                 EACH SECTOR AND CLASS OF DISTANCE (FOR THE STUDIED *
C*                 VARIABLE) IS USED IN THE FORMULA (A0+AA*AVE**2).   *
C*                 THIS CALCULATED VALUE IS USED AS A DIVISOR IN OB-  *
C*                 TAINING THE RELATIVE VARIOGRAM. A0 AND AA ARE FOUND*
C*                 IN THE PROPORTIONAL EFFECT STUDY(SEE OPTION CARD6).*
C*                 WHEN IREL=1, LOCAL ARITHMETIC MEANS ARE USED FOR   *
C*                 THIS SAME PURPOSE; I.E. ALL VALUES OF THE LOCAL    *
C*                 VARIOGRAM ARE DIVIDED BY (A0+AA*(LOCAL MEAN)**2).  *
C*                 THIS VALUE REPRESENTS THE ESTIMATED LOCAL VARIAN-  *
C*                 CE. WHEN IS=1, EACH LOCAL ARITHMETIC MEAN IS THE   *
C*                 AVERAGE VALUE OF THE SEGMENTS WITHIN A DRILL HOLE. *
C*        ISORT  - WHEN ISORT=0, NO DATA ARE PRINTED;                  *
C*                 WHEN ISORT=1, ALL SELECTED DATA ARE PRINTED;       *
C*                 WHEN ISORT=2,DATA ARE PRINTED AFTER ROTATIONS HAVE *
C*                 BEEN APPLIED TO COORDINATES;                       *
C*        LOGGR  - WHEN APPLIED (LOGGR=1) ADDITIONNAL GRAPHS USING    *
C*                 LOGARITHMIC DISTANCES ARE PRINTED FOR ABSOLUTE AND *
C*                 RELATIVE VARIOGRAMS; OPTION IS NOT USED IF         *
C*                 LOGGR=0;                                           *
C*        INTER  - OPTION WHICH INDICATES THAT ALL VARIOGRAM SECTORS  *
C*                 OTHER THAN THE AVERAGE VARIOGRAM ARE DISJOINT      *
C*                 (INTER=0); WHEN OVERLAPPING SECTORS OCCUR,         *
C*                 INTER=1; IF THE VALUE READ IN FOR IDIR IS ZERO,    *
C*                 THEN INTER=0.                                      *
C*        ISTOP  - OPTION WHICH PERMITS USER TO TERMINATE EXECUTION   *
C*                 AT CERTAIN STEPS IN THE PROGRAM (ISTOP=0 OR 1) OR  *
C*                 TO SKIP THE PRINTING OF GRAPHS;                    *
C*                 IF ISTOP=0, OPTION IS NOT USED;                    *
C*                 IF ISTOP=1, PROGRAM TERMINATES AFTER ANALYZING THE *
C*                 PROPORTIONAL EFFECT MODEL (IF ILOG=0) OR AFTER     *
C*                 SORTING DATA (ILOG=1);                             *
C*                 IF ISTOP=2, VARIOGRAM GRAPHS ARE NOT PRINTED;      *
C*        IBIG   - OPTION WHICH APPLIES ONLY WHEN IS=1;               *
C*                 IF IBIG=0, OPTION IS NOT APPLIED;                  *
C*                 IF IBIG=1 (AND IS=1) SAMPLES ARE STORED ON TAPE3   *
C*                 AND DIMENSIONS ARE REDUCED (SEE K3);               *
C*                 THIS OPTION IS USED ONLY WHEN THE NUMBER OF        *
C*                 SAMPLES IS TOO GREAT TO BE STORED IN MEMORY.  USE  *
C*                 OF THIS OPTION WILL INCREASE EXECUTION TIME.       *
C*        INDC   - ZONE INDICATOR                                     *
C*                 THE ONLY SAMPLES ACCEPTED ARE THOSE WITH IRS .EQ.  *
C*                 INDC. SEE CARD 8.                                  *
C*        ISAME  - OPTION TO ELIMINATE, WITHIN EACH DRILL HOLE, ALL   *
C*                 GROUPS OF ISAME OR MORE SEGMENTS WITH EQUAL VARIA- *
C*                 BLE VALUES. THIS OPTION WILL BE USED WHEN IS=1 AND *
C*                 WHEN EQUAL LENGTH SEGMENTS WILL HAVE BEEN CREATED  *
C*                 USING MEG2040.                                     *
C*                 ISAME MUST BE GREATER OR EQUAL TO 2.               *
C*                 OPTION IS NOT USED WHEN ISAME=0.                   *
```

```
C*          IDR     - NUMBER OF SUB-REGIONS WHERE SAMPLES ARE TO BE
C*                    REJECTED.
C*                    A MAXIMUM OF 10 SUB-REGIONS CAN BE SPECIFIED.
C*                    IF IDR=0, NO SUBREGIONS ARE DEFINED. (SEE CARD 8)!
C*          IDEF    - TEN-CHARACTER LABEL FOR THE NAME OF THE VARIABLE
C*                    UNDER STUDY!
C*                    DEFAULT IS 10H VARIABLE !
C*
C*      CARD 3 - BSUP, BINF, XCHEL, STEPZ, ALFA, BETA, A0, AA
C*               FORMAT READ IS (8F10.4)
C*          BSUP    - SUPERIOR LIMIT OF VARIABLE VALUES (EXCLUDED)!
C*          BINF    - INFERIOR LIMIT OF VARIABLE VALUES (EXCLUDED)!
C*                    IF BSUP AND BINF ARE NOT SPECIFIED, ALL VALUES
C*                    WILL BE ACCEPTED!
C*                    IF ONLY BINF IS SPECIFIED, ALL VALUES GREATER THAN
C*                    BINF WILL BE KEPT!
C*          XCHEL   - UPPER LIMIT OF ABSCISSAS FOR ALL GRAPHS!
C*                    DEFAULT VALUE IS (K7+1)*AMAX1(STEP(I))!
C*          STEPZ   - THREE POSSIBILITIES!
C*                    IF IS.EQ.2 STEPZ REPRESENTS THE GREATEST DISTANCE
C*                    ALLOWED BETWEEN Z COORDINATES OF SAMPLE PAIRS USED
C*                    IN CALCULATING THE EXPERIMENTAL VARIOGRAM!
C*                    IF STEPZ.LT.0, ALL Z COORDINATES ARE SET TO ZERO
C*                    AND THE VARIOGRAM IS CALCULATED WITH A TWO DIMEN-
C*                    SIONAL VARIABLE (IS=2)!
C*                    IF IS=1 OR IS=3 THEN STEPZ=0.0!
C*          ALFA    - ANGLE OF ROTATION(DEGREES) IN X/Y PLANE FROM THE
C*                    X-AXIS. ALFA IS POSITIVE IN COUNTER-CLOCKWISE.
C*                    IT IS ALSO THE TETA ANGLE IN SPHERICAL COORDINATES.
C*          BETA    - ANGLE OF ROTATION FOR Y/Z COORDINATES (ROTATION
C*                    OCCURS AFTER ALFA)!
C*                    POSITIVE ANGLE VALUES CORRESPOND TO COUNTER-
C*                    CLOCKWISE ROTATIONS FROM ROTATED Y-AXIS.
C*          A0,AA   - COEFFICIENTS TO BE USED IN THE PROPORTIONAL EFFECT
C*                    MODEL. WHEN A0 AND AA ARE SPECIFIED (I.E.,A0.AND.AA.
C*                    NE.0.0) THESE PARAMETERS WILL BE USED FOR RELATIVE
C*                    VARIOGRAMS INSTEAD OF THE VALUES CALCULATED BY PA-
C*                    RABOLIC REGRESSION BETWEEN LOCAL MEANS AND VARIAN-
C*                    CES. IF AA IS SPECIFIED AND IBIG=1, THE GRAPHICAL
C*                    DISPLAY OF THE PROPORTIONAL EFFECT MODEL WILL BE
C*                    OMITTED.
C*
C*      CARD 4 - THIS OPTION CARD IS NOT READ IF IDIR IS ZERO!
C*               IDIR IS ZERO!
C*               PSI(I),PHIXY(I),PHIYZ(I)    (I=1,IDIR)
C*               FORMAT READ IS (6F10.2)
C*               TWO DIRECTIONS ARE SPECIFIED ON EACH CARD!
C*          PSI     - HALF THE TOTAL OPENING (IN DEGREES) FOR EACH
C*                    SECTOR!
C*          PHIXY,PHIYZ - ANGLES DEFINING EACH SECTOR'S DIRECTION.
C*                    PHIXY IS THE TETA ANGLE IN THE SPHERICAL COORDINA-
C*                    TES SYSTEM.
C*                    PHIYZ CAN BE GREATER THEN 90.0 DEGREES (SEE OPTION
C*                    CARD 2, IDIR). PHIYZ IS MEASURED, IN THE Y/Z PLANE,
C*                    COUNTER-CLOCKWISE POSITIVE FROM THE ROTATED Y-AXIS.
C*                    THESE ANGLES ARE USED TO DEFINE THE ORIENTATION OF
C*                    THE MEDIAN LINE OF EACH SECTOR (OR CONE)!
```

```
C*
C*      CARD 5 - (STEP(I),I=1,IDIR);
C*               FORMAT READ IS (8F10.3)
C*           STEP   - DISTANCE CLASSES FOR EACH SECTOR.
C*                    ALL PAIRS OF SAMPLES FALLING IN THE
C*                    SAME SECTOR WILL BE GROUPED ACCORDING TO THEIR
C*                    DISTANCES.  STEP(I) IS THE UNIT LENGTH TO BE USED
C*                    FOR GROUPING THE DISTANCES WITHIN THE I-TH SECTOR.
C*                    THE FIRST DISTANCE CLASS IS EQUAL TO STEP/2.0.
C*                    IF ONLY STEP(1) IS SPECIFIED, ALL DIRECTIONS WILL
C*                    USE THIS SAME CLASS DISTANCE VALUE.
C*
C*      CARD 6 - THIS CARD IS NOT READ IF ILOG=1;
C*               PX, PY, PZ, N3X, N3Y, N3Z
C*               FORMAT READ IS (3F10.2,3I5)
C*          PX,PY,PZ - RESPECTIVE DIMENSIONS OF LOCAL ZONE. THE AREA OF
C*                    STUDY WILL BE SUBDIVIDED INTO SUCH ZONES TO DEFINE
C*                    A0 AND AA PARAMETERS OF THE PROPORTIONAL
C*                    EFFECT STUDY.  IF IREL=1, THESE SAME DIMENSIONS
C*                    WILL BE USED TO DETERMINE LOCAL ARITHMETIC MEANS;
C*          N3X,N3Y,N3Z - NUMBER OF BLOCKS ALONG EACH AXIS WITHIN THE
C*                    LOCAL ZONES TO BE USED IN RECALCULATING THE
C*                    PROPORTIONAL EFFECT COEFFICIENTS(A0 AND AA);
C*                    DEFAULTS ARE SET AT ONE;
C*               EACH LOCAL FIELD OF DIMENSIONS PX BY PY BY PZ IS
C*               SUBDIVIDED ALONG X-AXIS BY N3X, ALONG Y-AXIS BY N3Y
C*               AND ALONG Z-AXIS BY N3Z.  THE LOCAL FIELD IS DEFINED
C*               WITH RESPECT TO A REFERENCE POINT.  THIS REFERENCE
C*               POINT IS RELOCATED N3X*N3Y*N3Z TIMES AND, FOR EACH
C*               DISPLACEMENT, A NEW VALUE OF A0 AND AA IS COMPUTED. THE
C*               FINAL COEFFICIENTS OF THE PROPORTIONAL EFFECT STUDY
C*               WILL BE THE AVERAGE OF ALL VALUES COMPUTED.
C*
C*      CARD 7 - XMI(I),XMA(I),YMI(I),YMA(I),ZMI(I),ZMA(I) (I=1,IR)
C*               FORMAT READ IS (6F10.2)
C*               A NEW CARD IS READ FOR EVERY IR;
C*               VALUES READ ARE BOUNDARIES FOR STUDIED REGIONS
C*               (PARALELEPIPED); ONLY THE SAMPLES OUTSIDE OF THESE
C*               REGIONS WILL BE REJECTED;
C*               THE SMALLEST VALUES FOR XMI, YMI, AND ZMI WILL
C*               CORRESPOND TO THE REFERENCE POINT USED IN THE PRO-
C*               PORTIONAL EFFECT STUDY;
C*
C*      CARD 8 - (XMID(I),XMAD(I),YMID(I),YMAD(I),ZMID(I),ZMAD(I),
C*               I=1,IDR)
C*               THIS CARD IS NOT READ WHEN IDR=0.
C*               FORMAT READ IS (6F10.0)
C*               A NEW CARD IS READ FOR EVERY IDR.
C*               VALUES READ ARE BOUNDARY COORDINATES FOR SUB-REGIONS
C*               NOT TO BE STUDIED. THE SAMPLES INSIDE THESE REGIONS
C*               WILL BE REJECTED.
C*          XMID(I) - MINIMUM X (DEPARTURE) COORDINATE
C*          XMAD(I) - MAXIMUM X (DEPARTURE) COORDINATE
C*          YMID(I) - MINIMUM Y (LATITUDE) COORDINATE
C*          YMAD(I) - MAXIMUM Y (LATITUDE) COORDINATE
C*          ZMID(I) - MINIMUM Z (ELEVATION) COORDINATE
C*          ZMAD(I) - MAXIMUM Z (ELEVATION) COORDINATE
```

```
C*
C*      CARD 9 - FMT
C*               FORMAT READ IS (8A10)
C*           FMT    - FORMAT FOR READING INPUT DATA FILE TAPE(IN);
C*
C*               READING STATEMENT IS:
C*                    READ(6,FMT)INOM,X(N),Y(N),Z(N1),V2,IRS
C*                    WITH, INOM = SAMPLE NUMBER
C*                          X(N) = DEPARTURE COORDINATE (X)
C*                          Y(N) = LATITUDE  COORDINATE (Y)
C*                          Z(N1)= ELEVATION COORDINATE (Z)
C*                                 WHEN TWO DIMENSIONS ARE USED, THE
C*                                 VALUE READ IN IS REPLACED BY ZERO;
C*                          V2   = VARIABLE VALUE
C*                          IRS  = REJECTION INDICATOR
C*                                 IF(IRS-INDC.EQ.0) THE VALUE READ IS
C*                                 ACCEPTED. OTHERWISE IT IS REJECTED.
C*
C*      CARD 10 - GRMIN,GRMAX,VRMIN,VRMAX
C*               FORMAT READ IS (8F10.4)
C*               WHEN THIS CARD IS NOT USED, ALL LOCAL ZONES HAVING AT
C*               LEAST THREE POINTS WILL BE USED IN THE PROPORTIONAL
C*               EFFECT STUDY;
C*               THIS CARD IS NOT READ WHEN ILOG=1;
C*           GRMIN, GRMAX - MINIMUM AND MAXIMUM PERMISSIBLE LOCAL MEAN
C*                    VALUES FOR STUDYING THE PROPORTIONAL EFFECT MODEL
C*                    (INCLUDED);
C*           VRMIN,VRMAX - MINIMUM AND MAXIMUM PERMISSIBLE LOCAL
C*                    VARIANCES TO BE USED IN THE STUDY OF THE
C*                    PROPORTIONAL EFFECT MODEL (INCLUDED);
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C*
C******OUTPUT DISPOSITION
C*
C*      SECTION 1 - OPTIONS APPLIED ARE PRINTED;
C*      SECTION 2 - LIST OF DATA IS PRINTED FOLLOWED BY SOME BASIC
C*                  STATISTICS;
C*      SECTION 3 - A PROPORTIONAL EFFECT STUDY IS PRINTED WITH A GRAPH
C*                  OF PARABOLIC REGRESSION BETWEEN VARIANCES AND LOCAL
C*                  MEANS;
C*      SECTION 4 - A TABLE OF VARIOGRAM VALUES IS PRINTED FOR EACH DI-
C*                  RECTION, FOLLOWED BY GRAPHICAL PRESENTATION OF
C*                  THE RESULTS.
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C*
C******DESCRIPTION OF PARAMETERS
C*
```

```
C*      X,Y,Z  - ARRAYS CONTAINING THREE-DIMENSIONAL COORDINATES OF      *
C*               SAMPLES;                                                *
C*      V      - ARRAY CONTAINING THE VALUES OF STUDIED VARIABLE;        *
C*      KN     - ARRAY CONTAINING THE NUMBER OF SAMPLES FOUND WITHIN     *
C*               EACH RESPECTIVE DRILL HOLE;                             *
C*      XG     - ARRAY CONTAINING AVERAGE DISTANCES FOR GRAPHS;          *
C*      YG     - ARRAY CONTAINING VARIOGRAM VALUES;                      *
C*      ZG     - ARRAY CONTAINING DRIFT VALUES;                          *
C*      WG     - ARRAY CONTAINING RELATIVE VARIOGRAM VALUES;             *
C*      IGA,IGB - TEMPORARY STORAGE ARRAYS FOR GRAPHICAL DATA            *
C*               (MEG2203);                                              *
C*      BMOY   - ARRAY CONTAINING THE ARITHMETIC MEAN FOR EACH ZONE;     *
C*      VMOY   - ARRAY CONTAINING THE ARITHMETIC VARIANCE FOR EACH       *
C*               ZONE;                                                   *
C*      NMOY   - ARRAY CONTAINING THE NUMBER OF OBSERVATIONS FOR EACH    *
C*               ZONE;                                                   *
C*      GRADLC - ARRAY CONTAINING LOCAL MEANS ASSOCIATED WITH            *
C*               RESPECTIVE SAMPLES;                                     *
C*      VECTLG - ARRAY CONTAINING LOGARITHMS OF AVERAGE GRAPHICAL        *
C*               DISTANCES;                                              *
C*      NMOYA  - ARRAY CONTAINING THE NUMBER OF PAIRS ASSOCIATED WITH    *
C*               EACH LOCAL MEAN;                                        *
C*      IIIX,JJJY,KKKZ - TEMPORARY STORAGE ARRAYS FOR ZONE INDICES;      *
C*      DISTOT - ARRAY CONTAINING THE SUM OF DISTANCES BETWEEN THE TWO   *
C*               SAMPLE POINTS OF EVERY PAIR WITHIN EACH DISTANCE CLASS  *
C*               OF EACH SECTOR;                                         *
C*               (THE INDICES OF THIS ARRAY AND THE FOLLOWING ONES       *
C*                CORRESPOND TO A SECTOR AND A DISTANCE CLASS);          *
C*      EFF    - ARRAY CONTAINING THE NUMBERS OF PAIRS WITHIN EACH       *
C*               DISTANCE CLASS OF EACH SECTOR;                          *
C*      S1     - ARRAY CONTAINING THE SUM OF DIFFERENCES BETWEEN THE     *
C*               TWO VARIABLE VALUES OF EVERY PAIR WITHIN EACH DISTANCE  *
C*               CLASS OF EACH SECTOR;                                   *
C*      S2     - ARRAY CONTAINING THE SUM OF SQUARES OF DIFFERENCES      *
C*               BETWEEN THE TWO VARIABLE VALUES OF EVERY PAIR WITHIN    *
C*               EACH DISTANCE CLASS OF EACH SECTOR;                     *
C*      SS3    - IF IREL>0, ARRAY CONTAINING THE SUM OF SQUARES OF       *
C*               DIFFERENCES BETWEEN THE TWO VARIABLE VALUES OF EVERY    *
C*               PAIR WITHIN EACH DISTANCE CLASS OF EACH SECTOR, FOR     *
C*               A LOCAL ZONE;                                           *
C*      S3     - IF IREL>0, IT IS SS3 DIVIDED BY THE ESTIMATED LOCAL     *
C*               VARIANCE;                                               *
C*      AMOY   - ARRAY CONTAINING THE SUM OF THE MEANS OF THE TWO        *
C*               VARIABLE VALUES OF EVERY PAIR WITHIN EACH CLASS OF      *
C*               EACH SECTOR;                                            *
C*                                                                       *
C***********************************************************************
C*                                                                       *
C*                                                                       *
C***********************************************************************
C*                                                                       *
C******VARIABLE DIMENSIONS                                              *
C*                                                                       *
C*      K1 - TWO MORE THAN THE NUMBER OF ZONES USED FOR DETERMINING AA   *
C*           IF ILOG=1 THEN K1=1;                                        *
C*      K3 - K3 REPRESENTS THE TOTAL NUMBER OF SAMPLES WHEN IBIG=0;      *
C*           IF IBIG=1, K3 IS THE GREATEST NUMBER OF SAMPLES PER DRILL   *
```

```
C*          HOLE;
C*     K4 - DIMENSION FOR Z-COORDINATE VECTOR (I.E. K4=1 WHEN IS=2 AND
C*          STEPZ.LT.0.0; OTHERWISE K4=K3);
C*     K5 - NUMBER OF DRILL HOLES; USED WHEN IS=1, OTHERWISE K5=1;
C*     K6 - NUMBER OF DIRECTIONS TO BE STUDIED (IDIR);
C*     K7 - NUMBER OF POINTS IN VARIOGRAM;
C*     K8 - K8=K7+2;
C*     K9 - K9=K6 IF ILOG=0, OTHERWISE K9=1;
C*     K10 - K10=K7 IF ILOG=0, OTHERWISE K10=1;
C*     K12 - K12=K8 IF LOGGR=1, OTHERWISE K12=1;
C*     K13 - K13=K3 IF IREL=1 AND IS.NE.1, OTHERWISE K13=1;
C*     K14 - K14=MAX0(K1,K8);
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C******DISKFILES USED
C*
C*     TAPE2 - OUTPUT LISTING; (SEE OUTPUT DISPOSITION)
C*     TAPE3 - FILE USED FOR RECORDING SAMPLES WHEN IS=1 AND IBIG=1;
C*             (PFNO2)
C*     TAPE5 - INPUT DATA CARDS;
C*     TAPE6 - ORIGINAL DATA FILE; (PFNI) (READING STATEMENT, SEE
C*                                        (OPTION, CARD 9)
C*     TAPE7 - STORAGE OF RESULTS; (PFNO)
C*             RECORDING STATEMENT IS
C*                WRITE(7,12)DISMOY,M2,M3,EFF(I,LP2),M1
C*             12 FORMAT(3F15.5,I10,5E15.5)
C*             DISMOY      - AVERAGE DISTANCE OF ALL PAIRS OF SAMPLES
C*                           WHICH PARTICIPATED IN THE CALCULATION OF
C*                           THE EXPERIMENTAL VARIOGRAM VALUE M2 AND M3.
C*             M2          - EXPERIMENTAL VARIOGRAM VALUE
C*             M3          - EXPERIMENTAL RELATIVE VARIOGRAM VALUE
C*             EFF(I,LP2)  - NUMBER OF PAIRS OF SAMPLES WHICH
C*                           CALCULATED M2 AND M3.
C*             M1          - EXPERIMENTAL DRIFT VALUE.
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C******REQUIRED SUBROUTINES
C*
C*     MEG2201 - EXECUTES COORDINATES ROTATIONS;
C*     MEG2202 - CALCULATES VARIOGRAMS IN ALL DIRECTIONS STUDIED;
C*     MEG2203 - GRAPHICAL OUTPUT;
C*
C*********************************************************************
C*
C*
C*********************************************************************
C*
C******EXECUTION
C*
```

```
C*      H2200,CM120000,T400,IO600,P2.
C*      ACCOUNT,*****.
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
C*      BEGIN,CADD,PROCD,PROGRAMIN=MEG2200SOURCE,
C*      Q1 = NUMBER OF SAMPLES,
C*      Q3 IF STEPZ.LT.0 AND IS.EQ.2 THEN Q4=1
C*      Q4  OTHERWISE Q4 = Q3
C*      Q5  IS.EQ.1 THEN Q5 IS THE NUMBER OF DRILL HOLES
C*          OTHERWISE Q5 = 1
C*      Q6 = 5 IF VARIOGRAM HAS TWO DIMENSIONS (IDIR.EQ.0)
C*      Q6 = IDR IF IDIR.GT.0
C*      Q6 = 14 IF VARIOGRAM HAS THREE DIMENSIONS AND IDIR.EQ.0
C*      Q7  NUMBER OF POINTS IN VARIOGRAM
C*      Q8 = Q7 + 2
C*      Q9  IF ILOG.EQ.0 THEN Q9 = Q6 AND Q10 = Q7
C*      Q10 OTHERWISE Q9 = 1 ,Q10 = 1,
C*      Q12 IF LOGPR.EQ.1 THEN Q12 = Q8,OTHERWISE Q12 = 1,
C*      Q13 IF IREL = 1 THEN Q13 = Q3, OTHERWISE Q13 = 1
C*      Q14 = MAXO (K1,K8),
C*      PFNI  ORIGINAL DATA FILE TAPE6
C*      PFNO  STORAGE OF RESULTS TAPE7
C*      PFNO2 FILE USED FOR RECORDING SAMPLES WHEN IS=1 AND IBIG=1
C*            TAPE3.
C*
C**********************************************************************
C*
C*
C**********************************************************************
C*
C******DECLARATION OF VARIABLES
C*
C**********************************************************************
C*
C******VARIABLE DIMENSION ARRAYS DEFINED IN GEM2200 AND SHARED
C*     WITH MEG2202
C*
      REAL     X(K3),Y(K3),Z(K4),V(K3),DISTOT(K6,K7),
     -         S1(K6,K7),S2(K6,K7),AMOY(K9,K10),S3(K6,K7),SS3(K6,K7),
     -         XG(K8),YG(K8),ZG(K8),WG(K8),BMOY(K1),VMOY(K1),
     -         GRADLC(K13),VECTLG(K12)
      REAL XMID(10),XMAD(10),YMID(10),YMAD(10),ZMID(10),ZMAD(10)
      INTEGER IGA(K14),IGB(K14),NMOYA(K13),IIIX(K1),JJJY(K1),KKKZ(K1),
     -         NMOY(K1),KN(K5),EFF(K6,K7),FMT(8)
C*
C******COMMON BLOCK FOR MEG2202
C*
      COMMON /DATA/ PSI(14),PHIXY(14),PHIYZ(14),PI,K2,IDIR1,IREL
      COMMON/LOGO/LOGGR,INTER
      COMMON/REGRES/AA,BB,IND,A0,VMIN
      COMMON/KEEP/IDEF,ILOG,IDIR,IS,XCHEL,STEPZ,STEP(14),ICOM(16)
      COMMON/ARET/ISTOP
      COMMON/BANDE/IBIG
C*
      REAL MEAN,XMI(5),XMA(5),YMI(5),YMA(5),ZMI(5),ZMA(5)
C*
C*
C**********************************************************************
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

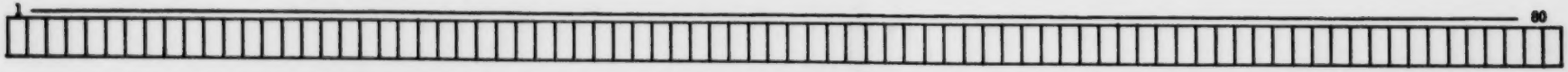
MEG2200 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 4
NAME _____

CARD NO. 1

(ICOM(I),I=1,8) FORMAT(8A10)



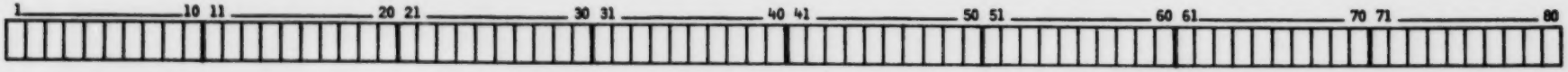
CARD NO. 2

IS ILOG IDIR IR IREL ISORT LOGGR INTER ISTOP IBIG INDC ISAME IDR IDEF

FORMAT(11I1,I2,A10)

CARD NO. 3

BSUP BINF XCHEL STEPZ ALFA BETA AQ AA



FORMAT(8F10.4)

MEG2200 - OPTION CARDS

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MAY, 1982

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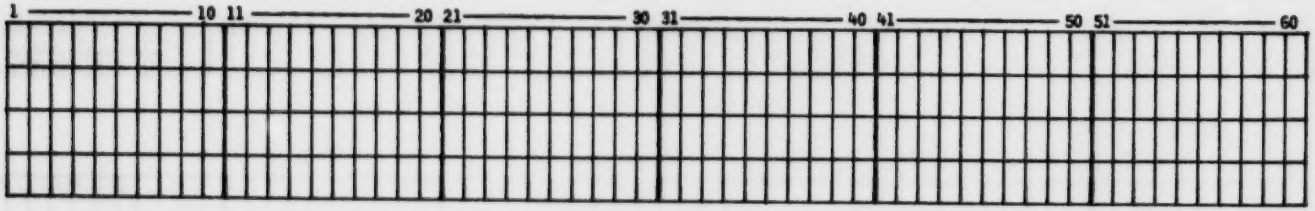
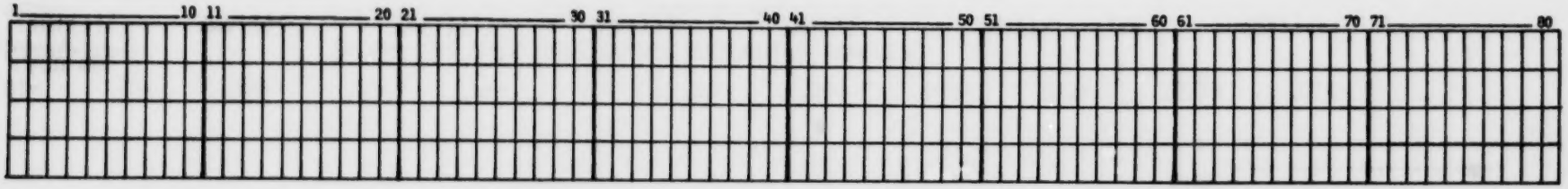
CARD NO. 4

(PSI(I),PHIXY(I),PHIYZ(I),I=1,IDIR) FORMAT(6F10.2)



CARD NO. 5

(STEP(I),I=1,IDIR) FORMAT(8F10.3)



CARD NO. 6

PX PY PZ N3X N3Y N3Z FORMAT(3F10.2,3I5)

MEG2200 - OPTION CARDS

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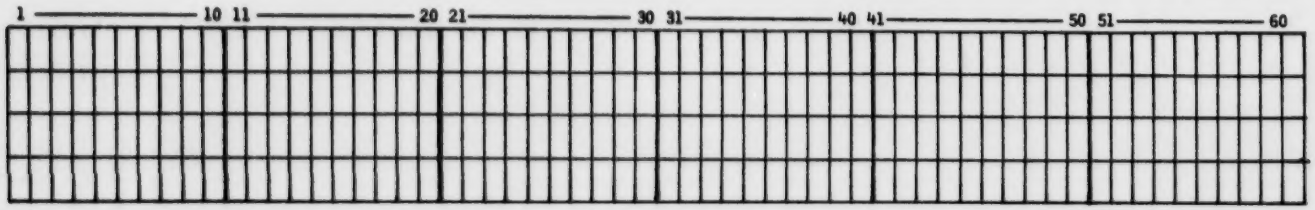
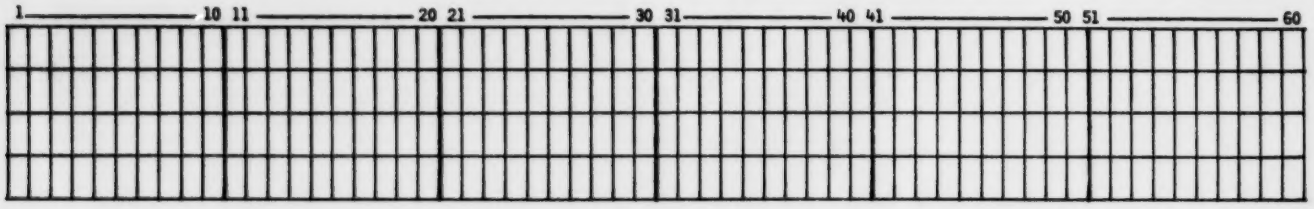
CARD NO. 7

(XMI(I), XMA(I), YMI(I), YMA(I), ZMI(I), ZMA(I),I=1,IR) FORMAT(6F10.2)



CARD NO. 8

(XMID(I), XMAD(I), YMID(I), YMAD(I), ZMID(I), ZMAD(I),I=1,IDR) FORMAT(6F10.0)



CARD NO. 9

(FMT(I),I=1,8) FORMAT(8A10)

MEG2200 - OPTION CARDS

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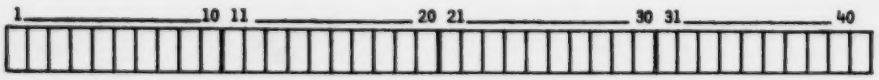
CARD NO. 10

GRMIN GRMAX VRMIN VRMAX FORMAT(4F10.4)



EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2200,
PFNI=                    ,(PERMANENT FILE NAME OF INPUT DATA FILE)
PFNO=                    ,(PERMANENT FILE NAME OF MEG2200 OUTPUT FILE)
PFNO2=                   ,(PERMANENT FILE NAME OUTPUT,RECORDING SAMPLES)
Q1=     ,Q3=     ,Q4=     ,Q5=     ,Q6=     Q7=     ,Q8=     ,Q9=     ,Q10=     Q12=     ,Q13=     ,Q14=     .
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2200 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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PAGE 1 OF 4
NAME RF

CARD NO. 1
(ICOM(I),I=1,8) FORMAT(8A10)

```
1                                                                              80
EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTAT., P.216
```

CARD NO. 2

IS	ILOG	IDIR	IR	IREL	ISORT	LOGGR	INTER	ISTOP	IBIG	INDC	ISAME	IDR	IDEF
1	2	3	4	5	6	7	8	9	10	11	12	13 14	15 24
3	0	5	1	1	1	0	0	0	0	0	0	0	VARIABLE

FORMAT(11I1,I2,A10)

CARD NO. 3

BSUP	BINF	XCHEL	STEPZ	ALFA	BETA	AQ	AA
1 10	11 20	21 30	31 40	41 50	51 60	61 70	71 80
100.0	0.0	0.0	-1.0	0.0	0.0	0.0	0.0

FORMAT(8F10.4)

MEG2200 - OPTION CARDS

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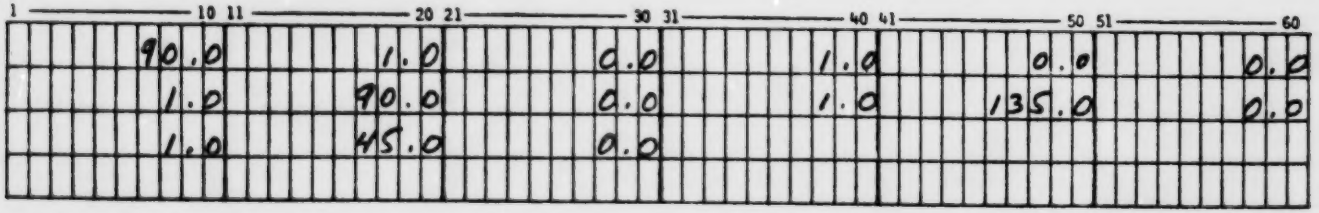
NAME RE

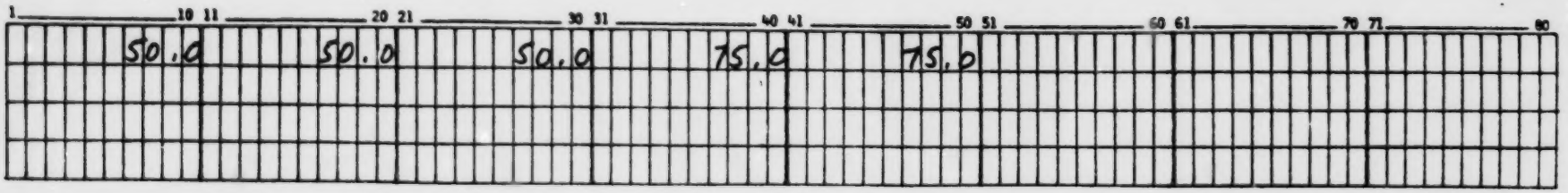
CARD NO. 4

(PSI(I),PHIXY(I),PHIYZ(I),I=1,IDIR) FORMAT(6F10.2)



CARD NO. 5

(STEP(I),I=1,IDIR) FORMAT(8F10.3)



CARD NO. 6

PX PY PZ N3X N3Y N3Z FORMAT(3F10.2,3I5)

MEG2200 - OPTION CARDS

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MAY, 1982

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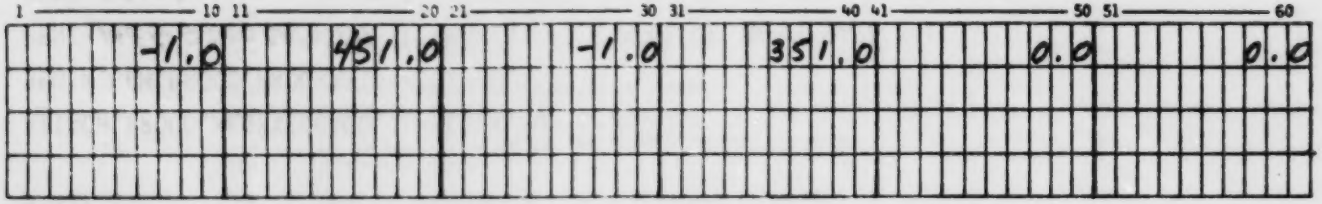
NAME RS

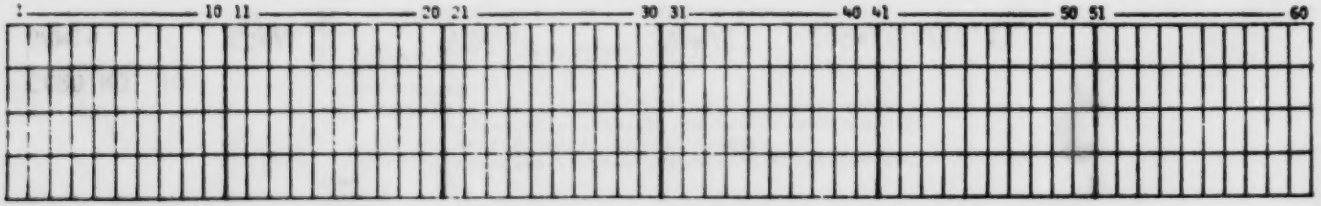
CARD NO. 7

(XMI(I), XMA(I), YMI(I), YMA(I), ZMI(I), ZMA(I),I=1,IR) FORMAT(6F10.2)



CARD NO. 8 (NOT USED)

(XMID(I), XMAD(I), YMID(I), YMAD(I), ZMID(I), ZMAD(I),I=1,IDR) FORMAT(6F10.0)



CARD NO. 9

(FMT(I),I=1,8) FORMAT(8A10)

MEG2200 - OPTION CARDS

VERSION NO. 1
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NAME RE

CARD NO. 10

GRMIN GRMAX VRMIN VRMAX FORMAT(4F10.4)

1 10 11 20 21 30 31 40

0.0 1000000.0 0.0 1000000.0

EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2200,
PFNI=MEG2200DATATEST,(PERMANENT FILE NAME OF INPUT DATA FILE)
PFNO=MEG2200DATATESTOUT,(PERMANENT FILE NAME OF MEG2200 OUTPUT FILE)
PFNO2=                  ,(PERMANENT FILE NAME OUTPUT,RECORDING SAMPLES)
Q1=15 ,Q3=41 ,Q4=1  ,Q5=1  ,Q6=5  Q7=4 ,Q8=6  ,Q9=5 ,Q10=4 Q12=6  ,Q13=41 ,Q14=15 .
```

20

```
      PROGRAM GEM2200(INPUT,OUTPUT,TAPE5=INPUT,TAPE6,TAPE7,
     -               TAPE2=OUTPUT,TAPE3)
      DIMENSION X(41),Y(41),Z(1),V(41),KN(1),
     -          DISTOT(5,4), EFF(5,4),S1(5,4),S2(5,4),
     -          AMOY(5,4),S3(5,4),SS3(5,4),
     -          XG(6),YG(6),ZG(6),WG(6)
      DIMENSION IGA(15),IGB(15),GRADLC(41),
     -          RMOY(15),VMOY(15),NMOY(15),
     -          IIIX(15),JJJY(15),KKKZ(15)
      DIMENSION VECTLG(6),NMOYA(41)
      INTEGER EFF
C*    NUMBER OF DISTINCT ZONES FOR CALCULATING LOCAL MEANS PLUS TWO:
C*    IF ILOG=1, THEN K1=1
      K1=15
C*    NUMBER OF SAMPLES
      K3=41
C*    IF 0.GT.STEPZ AND IS.EQ.2 THEN K4=1
C*    OTHERWISE K4=K3
      K4=1
C*    IF IS.EQ.1 THEN K5 IS THE NUMBER OF DRILL HOLES
C*    OTHERWISE K5=1
      K5=1
C*    KA=5 IF VARIOGRAM HAS TWO DIMENSIONS (IDIR.EQ.0)
C*    KA=IDIR IF IDIR.GT.0
C*    KA=14 IF VARIOGRAM HAS THREE DIMENSIONS
      K6=5
C*    NUMBER OF POINTS IN VARIOGRAM
      K7=4
      K8=K7+2
C*    IF ILOG.EQ.0 THEN K9=K6 AND K10=K7
C*    OTHERWISE K9=1,K10=1
      K9=5
      K10=4
C*    IF LOGGR.EQ.1 THEN K12=K8, OTHERWISE K12=1
      K12=6
C*    IF IMFL=1 THEN K13=K3, OTHERWISE K13=1
      K13=41
      K14=MAX0(K1,K8)
      CALL MEG2200(X,Y,Z,V,KN,DISTOT,EFF,S1,S2,S3,SS3,AMOY,
     -             XG,YG,ZG,WG,IGA,IGB,RMOY,VMOY,NMOY,GRADLC,
     -             VECTLG,NMOYA,IIIX,JJJY,KKKZ,
     -             K1,K3,K4,K5,K6,K7,K8,K9,K10,K12,K13,K14)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	ICON=	EXECUTION EXAMPLE OF ME02200 - DATA TAKEN FROM JOURNEL, MINING GEO. P.216	TITLE OF VARIOGRAM:
2	IS=	2	CHOICE OF VARIOGRAM CALCULATION: IS=1: VARIOGRAM CALCULATED ALONG DRILL HOLES: IS=2: VARIOGRAM IN TWO DIMENSIONS: IS=3: VARIOGRAM IN THREE DIMENSIONS:
	ILOG=	0	LOGARITHMIC VALUES ARE USED WHEN ILOG=1 (ELSE ILOG=0):
	IDIR=	5	NUMBER OF DIRECTIONS FOR WHICH A VARIOGRAM WILL BE COMPUTED (SEE DEFAULT FOR ZERO):
	IR=	1	NUMBER OF REGIONS OF STUDY: IR CARDS 7 CONTAINING COORDINATE BOUNDARY LIMITS OF REGIONS ARE READ: IR MUST BE AT LEAST EQUAL TO ONE:
	IREL=	1	CHOICE OF LOCAL MEAN FOR RELATIVE VARIOGRAM CALCULATION:
	ISORT=	1	PRINTING OPTION:
	LOGGR=	0	LOGARITHMIC DISTANCE OPTION FOR GRAPHS:
	INTER=	0	SECTORS OTHER THAN THE ONE USED FOR CALCULATING THE AVERAGE VARIOGRAM ARE DISJOINTS (INTER=0): OVERLAPPING SECTORS (INTER=1):
	ISTOP=	0	OPTION ALLOWING EARLY TERMINATION: NO EARLY TERMINATION IF ISTOP=0:
	IBIG=	0	OPTION ALLOWING USE OF TAPE3 FOR STORAGE OF DATA (IBIG=1):
	INOC=	0	ZONE INDICATOR
	ISAME=	0	VARIOGRAMS ARE CALCULATED ONLY WITH UNEQUAL VARIABLE VALUES IF ISAME.NE.0
	IOR=	0	NUMBER OF SUB-REGIONS FROM WHICH DATA IS REJECTED
	IDEF=	VARIABLE	NAME OF STUDIED VARIABLE:
3	BSUP=	100.0000	
	BINF=	0.0000	LIMITS OF ACCEPTABLE SAMPLE VALUES:
	XCHEL=	0.0000	GREATEST DISTANCE TO BE USED ON GRAPHS: DEFAULT IS (K7+1) X AMAX1(STEP(I)) WHEN XCHEL=0.0:
	STEPZ=	-1.0000	GREATEST DISTANCE BETWEEN Z COORDINATES OF TWO SAMPLES (UNLESS STEPZ.LT.0. IN WHICH CASE IS=2):
	ALFA=	0.0000	ROTATION IN THE X/Y PLANE:
	BETA=	0.0000	ROTATION IN THE Y/Z PLANE:
	AO=	0.0000	COEFFICIENTS FOR THE PROPORTIONAL EFFECT MODEL (IF CALCULATION IS UNDESIRED):
	AA=	0.0000	

```
4
        PSI( 1)=        90.00
        PHIXY(1)=        1.00
        PHIYZ(1)=        0.00

        PSI( 2)=         1.00
        PHIXY(2)=        0.00
        PHIYZ(2)=        0.00

        PSI( 3)=         1.00
        PHIXY(3)=       90.00
        PHIYZ(3)=        0.00

        PSI( 4)=         1.00
        PHIXY(4)=      135.00
        PHIYZ(4)=        0.00

        PSI( 5)=         1.00
        PHIXY(5)=       45.00
        PHIYZ(5)=        0.00
```

PSI IS HALF THE SECTOR (OR CONE) OPENING,
PHIXY IS THE TETA ANGLE IN THE SPHERICAL COORDINATE SYSTEM,
PHIYZ IS THE ANGLE BETWEEN THE MEDIAN LINE OF EACH SECTOR (CONE) AND ITS PROJECTION IN THE X/Y PLANE!

```
5       STEP( 1)=       50.00
        STEP( 2)=       50.00
        STEP( 3)=       50.00
        STEP( 4)=       75.00
        STEP( 5)=       75.00
```

DISTANCE INTERVALS CORRESPONDING TO EACH SECTOR (OR CONE) DEFINED BY PHIXY AND PHIYZ!

```
6       PX=           300.0000
        PY=           300.0000
        PZ=             0.0000

        N3X=                1
        N3Y=                1
        N3Z=                0
```

DIMENSIONS OF LOCAL ZONES TO BE USED IN CALCULATING LOCAL MEANS!

RESPECTIVE NUMBER OF STEPS TO BE USED FOR THE PROPORTIONAL EFFECT MODEL ALONG EACH AXIS!

```
7
        XMI( 1)=       -1.00
        XMA( 1)=      451.00
        YMI( 1)=       -1.00
        YMA( 1)=      351.00
        ZMI( 1)=        0.00
        ZMA( 1)=        0.00
```

BOUNDARY LIMITS OF THE FIELD OF STUDY!

```
9       FMT=        (I5,4F10.1,I1)
```

READING FORMAT OF INPUT DATA!

```
10      GMMIN=          0.000
        GMMAX=    1000000.000

        VMMIN=          0.0000
        VMMAX=    1000000.0000
```

PERMISSIBLE RANGE OF LOCAL MEAN GRADES (INCLUDED)!

PERMISSIBLE RANGE OF LOCAL VARIANCES (INCLUDED)!

SECTION 2 - LISTING OF DATA AND BASIC STATISTICS

SAMPLE NUMBER	COORDINATES X	Y	Z	VARIABLE VALUES V2
1	0.0000	350.0000	0.0000	35.00000
2	50.0000	350.0000	0.0000	35.00000
3	100.0000	350.0000	0.0000	33.00000
4	150.0000	350.0000	0.0000	33.00000
5	200.0000	350.0000	0.0000	34.00000
6	250.0000	350.0000	0.0000	31.00000
7	300.0000	350.0000	0.0000	35.00000
8	350.0000	350.0000	0.0000	37.00000
9	400.0000	350.0000	0.0000	41.00000
10	450.0000	350.0000	0.0000	41.00000
11	0.0000	300.0000	0.0000	35.00000
12	50.0000	300.0000	0.0000	35.00000
13	100.0000	300.0000	0.0000	35.00000
14	250.0000	300.0000	0.0000	35.00000
15	300.0000	300.0000	0.0000	33.00000
16	450.0000	300.0000	0.0000	41.00000
17	0.0000	250.0000	0.0000	37.00000
18	50.0000	250.0000	0.0000	35.00000
19	100.0000	250.0000	0.0000	37.00000
20	150.0000	250.0000	0.0000	35.00000
21	250.0000	250.0000	0.0000	37.00000
22	300.0000	250.0000	0.0000	37.00000
23	350.0000	250.0000	0.0000	39.00000
24	400.0000	250.0000	0.0000	39.00000
25	450.0000	250.0000	0.0000	41.00000
26	0.0000	200.0000	0.0000	37.00000
27	50.0000	200.0000	0.0000	40.00000
28	100.0000	200.0000	0.0000	42.00000
29	200.0000	200.0000	0.0000	34.00000
30	250.0000	200.0000	0.0000	36.00000
31	300.0000	200.0000	0.0000	41.00000
32	450.0000	200.0000	0.0000	34.00000
33	0.0000	150.0000	0.0000	37.00000
34	100.0000	150.0000	0.0000	41.00000
35	250.0000	150.0000	0.0000	33.00000
36	150.0000	100.0000	0.0000	35.00000
37	350.0000	100.0000	0.0000	42.00000
38	400.0000	100.0000	0.0000	33.00000
39	350.0000	50.0000	0.0000	39.00000
40	450.0000	50.0000	0.0000	31.00000
41	250.0000	0.0000	0.0000	30.00000

41 SAMPLES HAVE BEEN READ. DIMENSIONS DO NOT ALLOW PROGRAM TO READ MORE DATA, SO ONLY THESE SAMPLES WILL BE USED.

NUMBER OF SAMPLES:	41
MEAN:	36.3659
VARIANCE:	10.48780
THE SMALLEST VALUE AVAILABLE FOR K1 IS:	6

SECTION 3 - PROPORTIONAL EFFECT STUDY

INDICES OF REFERENCE BLOCK:	1	1	1
COORDINATES OF REFERENCE POINT:	-1.000	-1.000	0.000
NUMBER OF ZONES ALONG EACH RESPECTIVE AXIS:	2	2	1
TOTAL NUMBER OF INITIAL ZONES:	4		

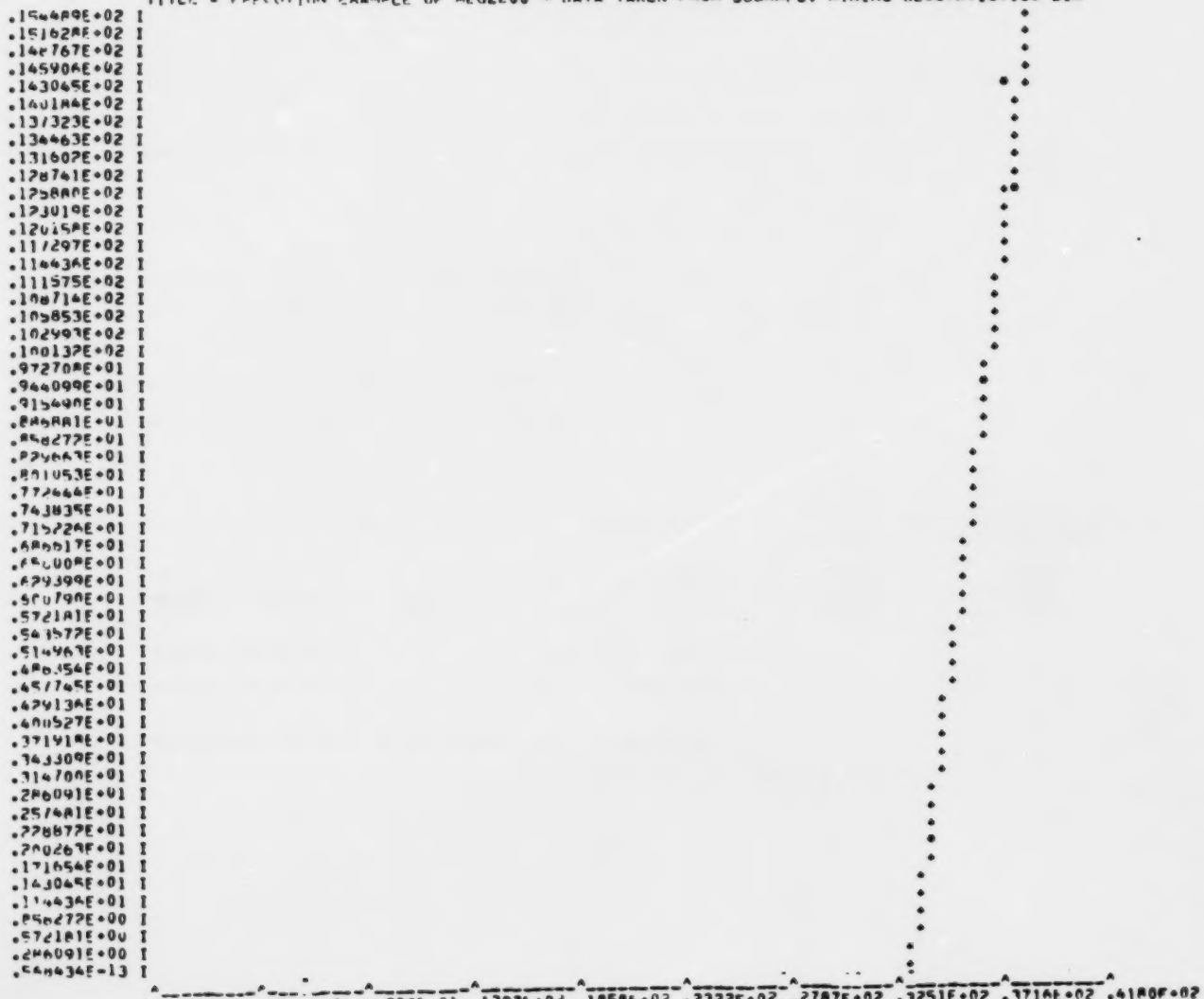
TOTAL NUMBER OF ZONES STUDIED: 4

TOTAL NUMBER OF POINTS: 41

TABLE OF DISTINCT ZONE STATISTICS OF VARIABLE

POINTS IN ZONE	INDICES: I	J	K	LOCAL MEAN	LOCAL VARIANCE
15	1	1	1	16.40000	9.40000
10	2	1	1	17.60000	14.04444
10	1	2	1	34.10000	1.87778
6	2	2	1	38.00000	12.40000

NAME OF VARIABLE = VARIABLE /PARABOLIC REGRESSION BETWEEN VARIANCES AND LOCAL MEANS/
TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216



COEFFICIENT OF TOTAL CORRELATION:	RR=	.973685461
AVERAGE VALUE OF A0:	A0=	-46.11514
AVERAGE VALUE OF AA:	AA=	.04194
NUMBER OF EVALUATIONS USED:		1

SECTION 4 - EXPERIMENTAL VARIOGRAMS

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

(WITH A FULL SECTOR OPENING OF 180.0 DEGREES)

NAME OF VARIABLE (V2) = VARIABLE SECTOR ANGULAR DIRECTIONS PHIXY = 1. DEGREES
PHIYZ = 0. DEGREES

CLASSES DIMENSION: .5000E+02

UPPER LIMIT FOR V2: .1000E+03

LOWER LIMIT FOR V2: 0.

ARITHMETIC MEAN OF V2: .3637E+02

ARITHMETIC VARIANCE OF V2: .1049E+02

CLASSES RANGES	NB OF PAIRS IN CLASS	DRIFT	SEMI-VARIOGRAM	RELATIVE VARIOGRAM	AVERAGE DISTANCE OF PAIRS IN THE CLASS
25.0--- 75.0	83	0.00000	4.88747	.55431	59.23
75.0--- 125.0	101	.30693	8.92178	1.01595	107.36
125.0--- 175.0	112	.22321	11.23661	1.28164	151.25

NAME OF VARIABLE = VARIABLE / SEMI-VARIOGRAM / TOTAL OPENING OF SECTOR = 180.0
PHIXY = 1.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

NAME OF VARIABLE = VARIABLE / DRIFT / TOTAL OPENING OF SECTOR = 180.0
PHIXY = 1.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

NAME OF VARIABLE = VARIABLE / RELATIVE VARIOGRAM / TOTAL OPENING OF SECTOR = 180.0
PHIXY = 1.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MFG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

SECTION 4 - EXPERIMENTAL VARIOGRAMS

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

(WITH A FULL SECTOR OPENING OF 2.0 DEGREES)

NAME OF VARIABLE (V2) = VARIABLE SECTOR ANGULAR DIRECTIONS PHIXY = 0. DEGREES
PHIYZ = 0. DEGREES

CLASSES DIMENSION: .5000E+02

UPPER LIMIT FOR V2: .1000E+03

LOWER LIMIT FOR V2: 0.

ARITHMETIC MEAN OF V2: .3637E+02

ARITHMETIC VARIANCE OF V2: .1049E+02

CLASSES RANGES	NB OF PAIRS IN CLASS	DRIFT	SEMI-VARIOGRAM	RELATIVE VARIOGRAM	AVERAGE DISTANCE OF PAIRS IN THE CLASS
25.0--- 75.0	24	.37500	4.10417	.46414	50.00
75.0--- 125.0	20	1.00000	8.40000	1.09803	100.00
125.0--- 175.0	18	.16667	12.08333	1.44149	150.00

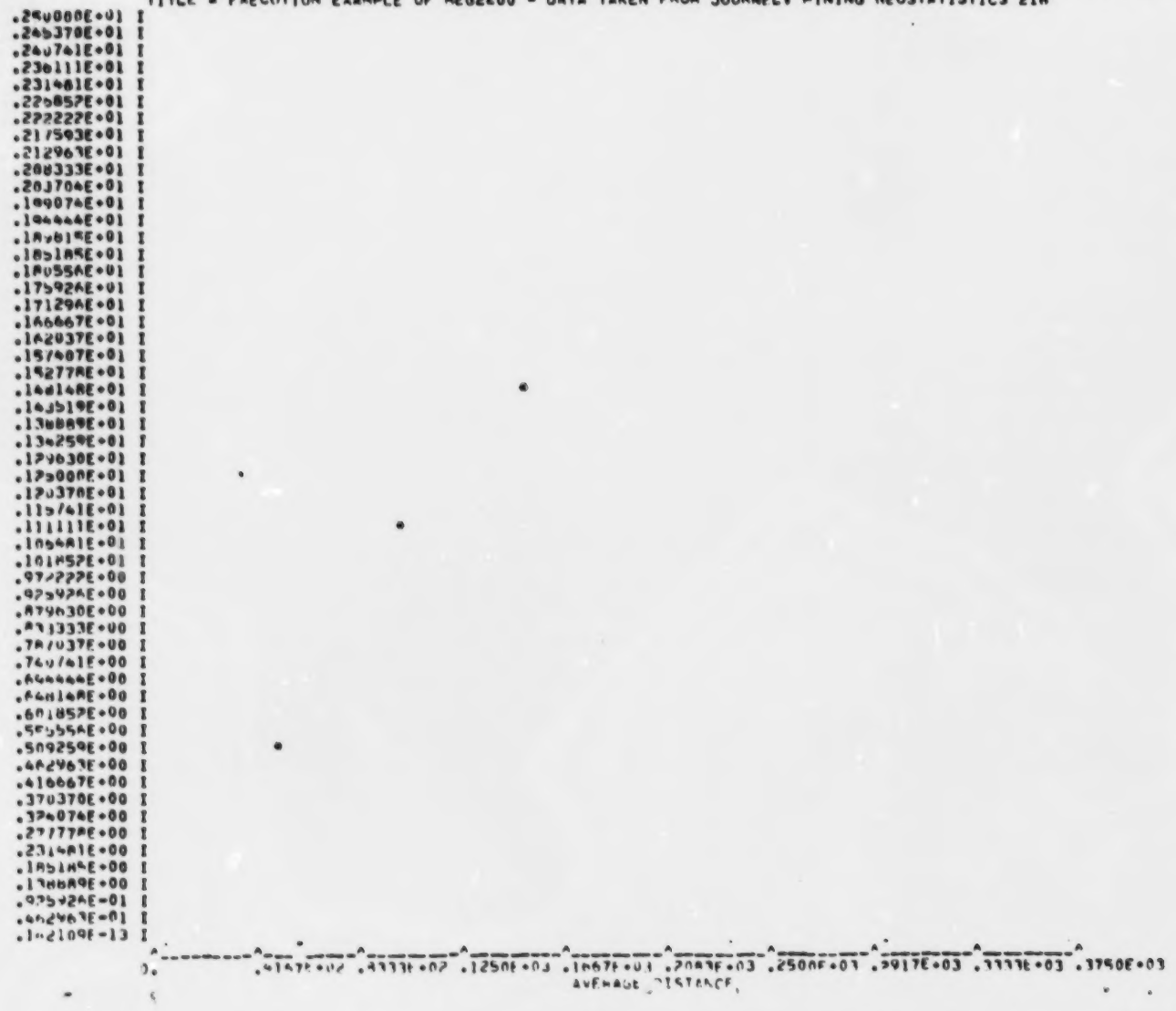
```
NAME OF VARIABLE = VARIABLE    /              SEMI-VARIOGRAM              /  TOTAL OPENING OF SECTOR =    2.0
                                                                              PHIXY =    0.0    PHIYZ =    0.0
TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216
.262195E+02 I
.257340E+02 I
.252484E+02 I
.247629E+02 I
.242773E+02 I
.237918E+02 I
.233062E+02 I
.228207E+02 I
.223351E+02 I
.218496E+02 I
.213640E+02 I
.208785E+02 I
.203930E+02 I
.199074E+02 I
.194219E+02 I
.189363E+02 I
.184508E+02 I
.179652E+02 I
.174797E+02 I
.169941E+02 I
.165086E+02 I
.160230E+02 I
.155375E+02 I
.150519E+02 I
.145664E+02 I
.140808E+02 I
.135953E+02 I
.131098E+02 I
.126242E+02 I
.121387E+02 I
.116531E+02 I
.111676E+02 I
.106820E+02 I
.101965E+02 I
.971093E+01 I
.922538E+01 I
.873984E+01 I
.825429E+01 I
.776874E+01 I
.728320E+01 I
.679765E+01 I
.631210E+01 I
.582656E+01 I
.534101E+01 I
.485547E+01 I
.436992E+01 I
.388437E+01 I
.339883E+01 I
.291328E+01 I
.242773E+01 I
.194219E+01 I
.145664E+01 I
.971093E+00 I
.485547E+00 I
.113687E-12 I
0.          .4167E+02 .8333E+02 .1250E+03 .1667E+03 .2083E+03 .2500E+03 .2917E+03 .3333E+03 .3750E+03
                                    AVERAGE DISTANCE
```

NAME OF VARIABLE = VARIABLE / DRIFT / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 0.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

NAME OF VARIABLE = VARIABLE / RELATIVE VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 0.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 214



SECTION 4 - EXPERIMENTAL VARIOGRAMS

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

(WITH A FULL SECTOR OPENING OF 2.0 DEGREES)

NAME OF VARIABLE (V2) = VARIABLE SECTOR ANGULAR DIRECTIONS PHIXY = 90. DEGREES
PHIYZ = 0. DEGREES

CLASSES DIMENSION: .5000E+02

UPPER LIMIT FOR V2: .1000E+03

LOWER LIMIT FOR V2: 0.

ARITHMETIC MEAN OF V2: .3637E+02

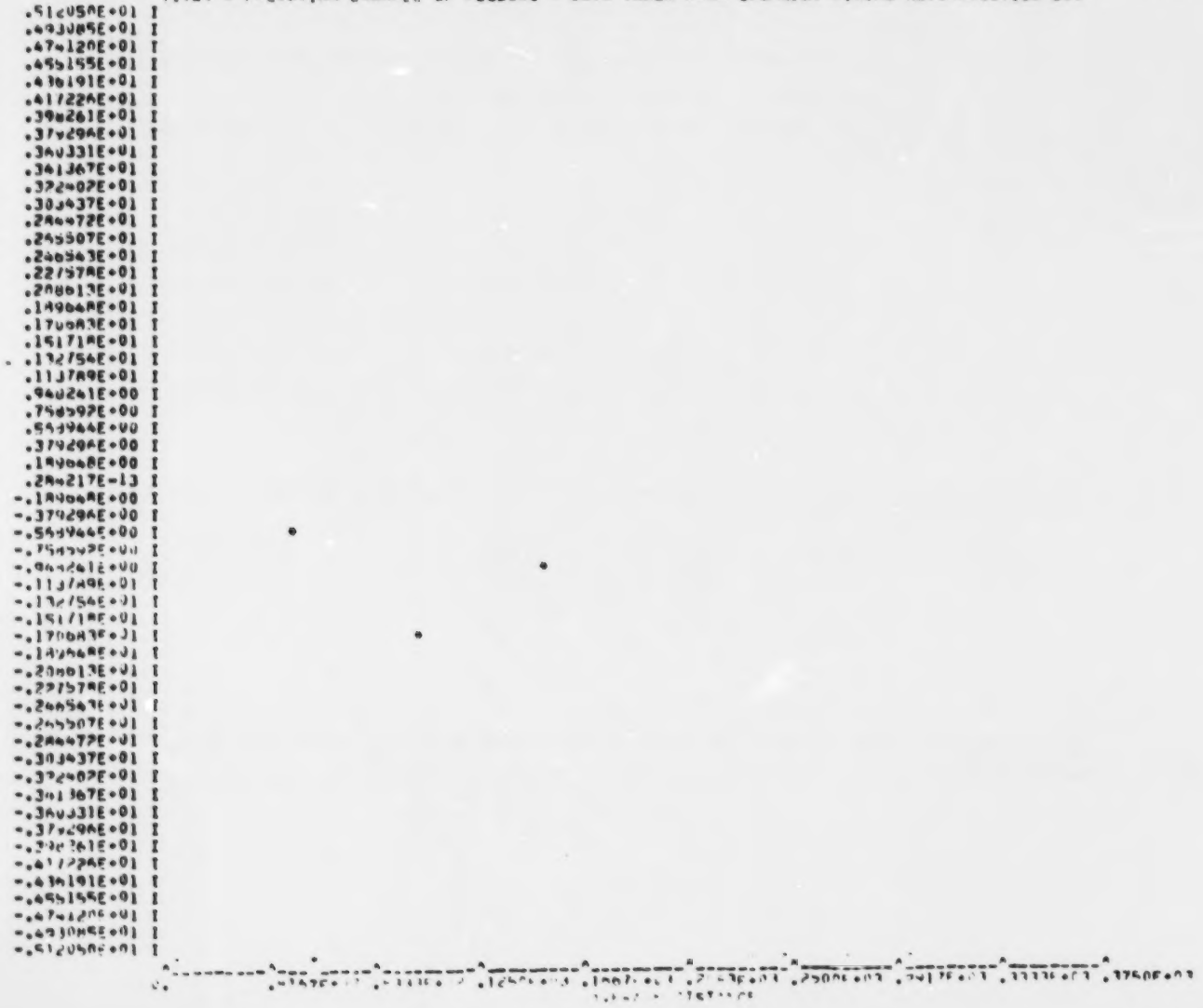
ARITHMETIC VARIANCE OF V2: .1049E+02

CLASSES RANGES	NB OF PAIRS IN CLASS	DRIFT	SEMI-VARIOGRAM	RELATIVE VARIOGRAM	AVERAGE DISTANCE OF PAIRS IN THE CLASS
25.0--- 75.0	22	-.59091	4.25000	.46189	50.00
75.0--- 125.0	18	-1.77778	8.22222	.94589	100.00
125.0--- 175.0	15	-1.13333	10.90000	1.28146	150.00

NAME OF VARIABLE = VARIABLE / SEMI-VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 90.0 PHIYZ = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

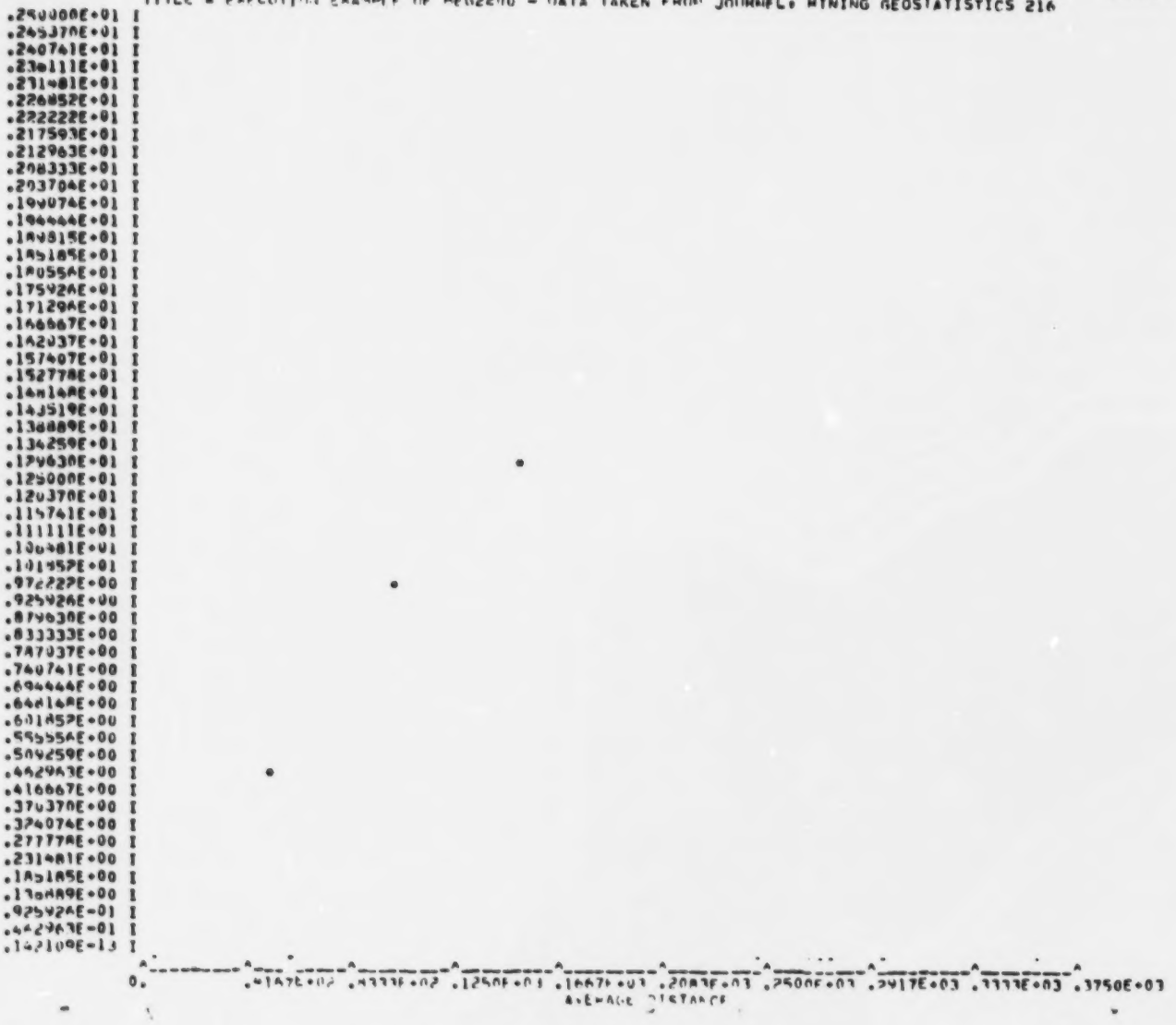
NAME OF VARIABLE = VARIABLE / DRIFT / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 90.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216



NAME OF VARIABLE = VARIABLE / RELATIVE VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIAY = 90.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216



SECTION 4 - EXPERIMENTAL VARIOGRAMS

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

(WITH A FULL SECTOR OPENING OF 2.0 DEGREES)

NAME OF VARIABLE (V2) = VARIABLE SECTOR ANGULAR DIRECTIONS PHIXY = 135. DEGREES
PHIYZ = 0. DEGREES

CLASSES DIMENSION: .7500E+02

UPPER LIMIT FOR V2: .1000E+03

LOWER LIMIT FOR V2: 0.

ARITHMETIC MEAN OF V2: .3637E+02

ARITHMETIC VARIANCE OF V2: .1049E+02

CLASSES RANGES	NB OF PAIRS IN CLASS	DRIFT	SEMI-VARIOGRAM	RELATIVE VARIOGRAM	AVERAGE DISTANCE OF PAIRS IN THE CLASS
37.5--- 112.5	19	-.68421	5.02632	.57874	70.71
112.5--- 187.5	16	-1.68750	11.90625	1.35552	141.42
187.5--- 262.5	10	1.50000	17.25000	2.14136	212.13

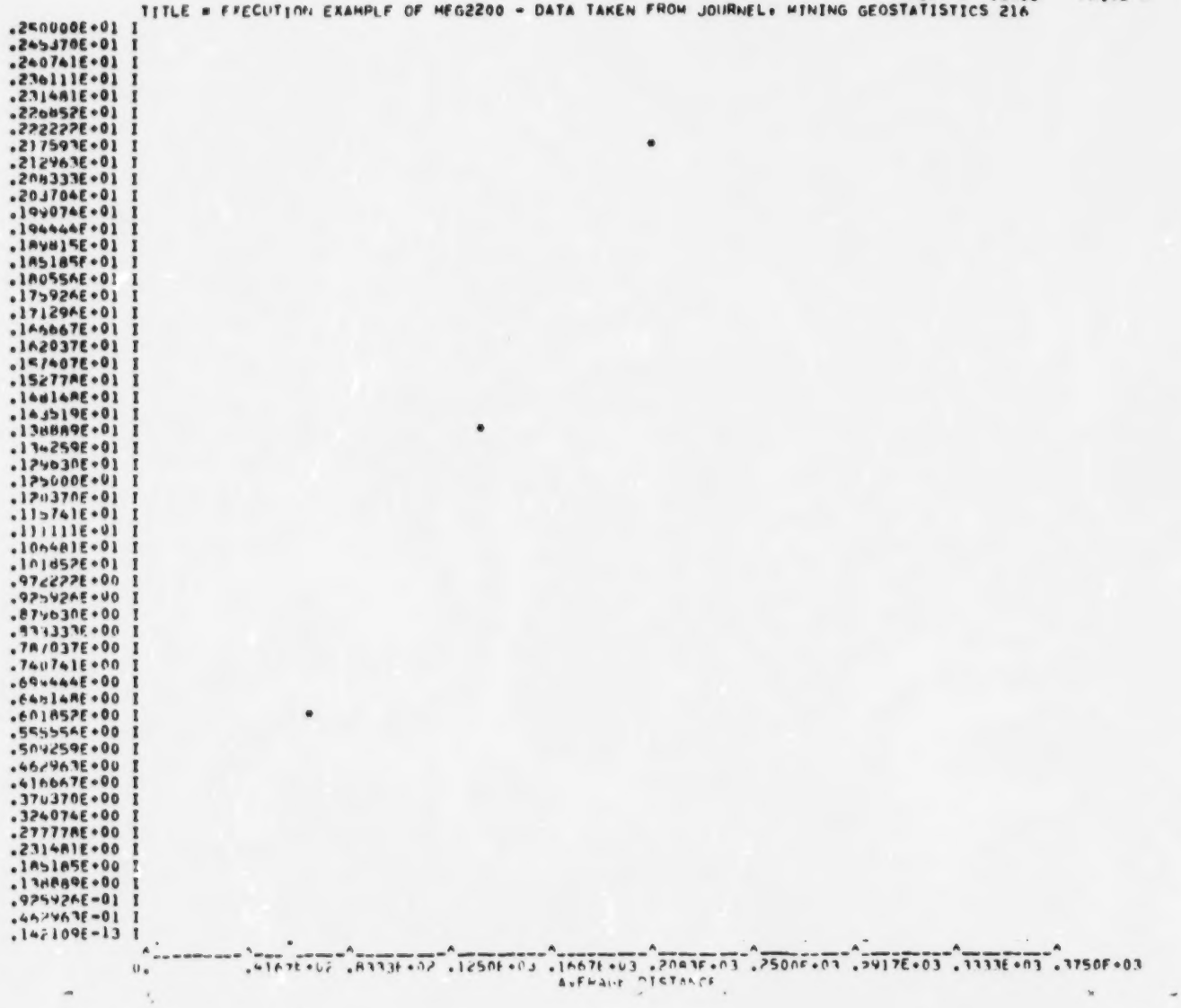
NAME OF VARIABLE = VARIABLE / SEMI-VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 135.0 PHIYZ = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 21A
.262195E+02
.257340E+02
.252484E+02
.247629E+02
.242773E+02
.237918E+02
.233062E+02
.228207E+02
.223351E+02
.218496E+02
.213640E+02
.208785E+02
.203930E+02
.199074E+02
.194219E+02
.189363E+02
.184508E+02
.179652E+02
.174797E+02
.169941E+02
.165086E+02
.160230E+02
.155375E+02
.150519E+02
.145664E+02
.140808E+02
.135953E+02
.131098E+02
.126242E+02
.121387E+02
.116531E+02
.111676E+02
.106820E+02
.101965E+02
.971093E+01
.922538E+01
.873984E+01
.825429E+01
.776874E+01
.728320E+01
.679765E+01
.631210E+01
.582656E+01
.534101E+01
.485547E+01
.436992E+01
.388437E+01
.339883E+01
.291328E+01
.242773E+01
.194219E+01
.145664E+01
.971093E+00
.485547E+00
.113087E-12
0.
.1458E+02 .2917E+02 .4375E+02 .5833E+02 .7292E+02 .8750E+02 .1021E+03 .1167E+03 .1312E+03 .1458E+03
AVERAGE DISTANCE

NAME OF VARIABLE = VARIABLE / DRIFT / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 135.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 214

NAME OF VARIABLE = VARIABLE / RELATIVE VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 135.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216



SECTION 4 - EXPERIMENTAL VARIOGRAMS

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

(WITH A FULL SECTOR OPENING OF 2.0 DEGREES)

NAME OF VARIABLE (V2) = VARIABLE SECTOR ANGULAR DIRECTIONS PHIXY = 45. DEGREES
PHIYZ = 0. DEGREES

CLASSES DIMENSION: .7500E+02

UPPER LIMIT FOR V2: .1000E+03

LOWER LIMIT FOR V2: 0.

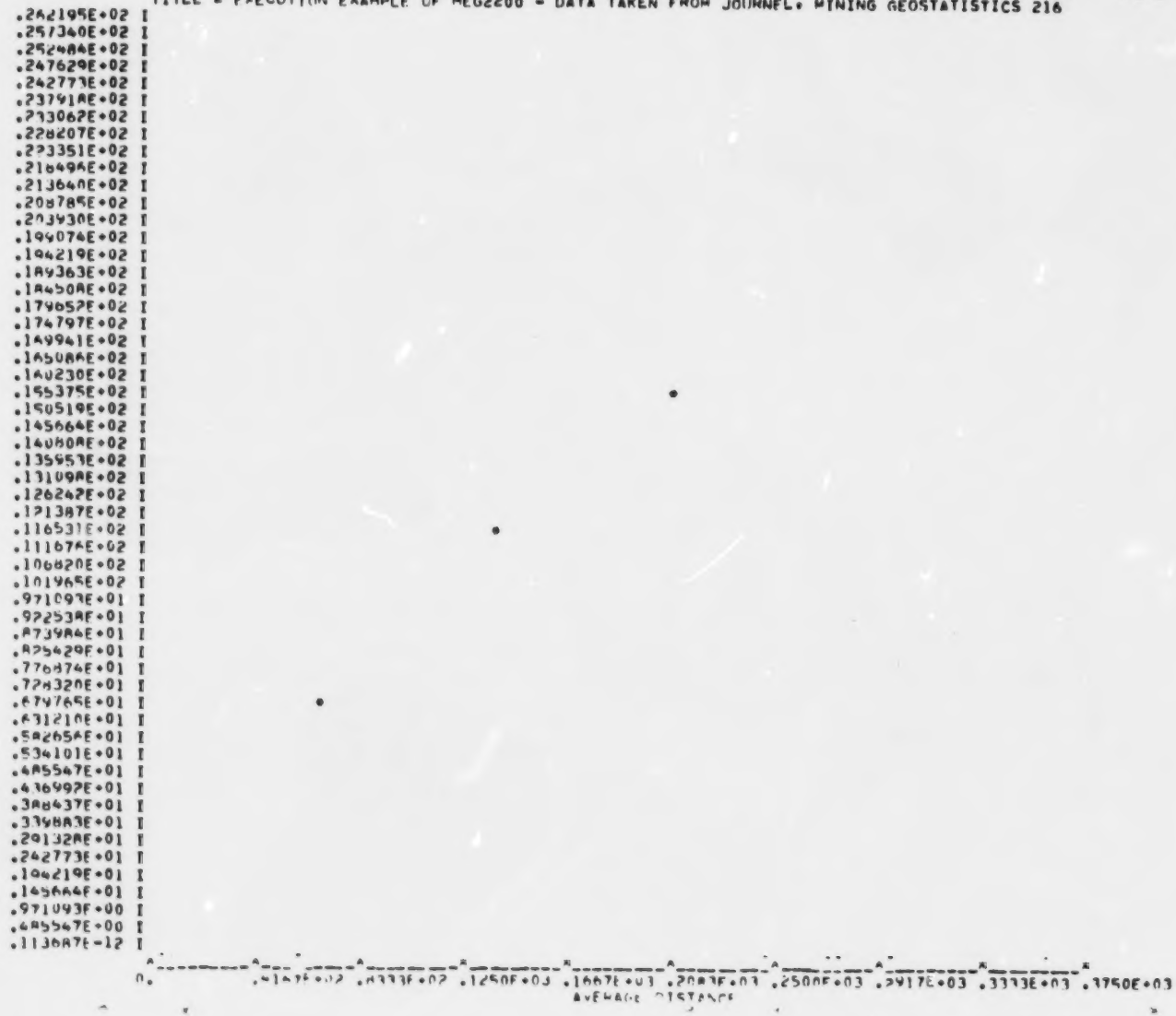
ARITHMETIC MEAN OF V2: .3637E+02

ARITHMETIC VARIANCE OF V2: .1049E+02

CLASSES RANGES	NB OF PAIRS IN CLASS	DRIFT	SEMI-VARIOGRAM	RELATIVE VARIOGRAM	AVERAGE DISTANCE OF PAIRS IN THE CLASS
37.5--- 112.5	18	-.50000	6.47222	.75902	70.71
112.5--- 187.5	14	.07143	11.25000	1.18062	141.42
187.5--- 262.5	8	-2.12500	15.43750	1.82916	212.13

NAME OF VARIABLE = VARIABLE / SEMI-VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 45.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 216

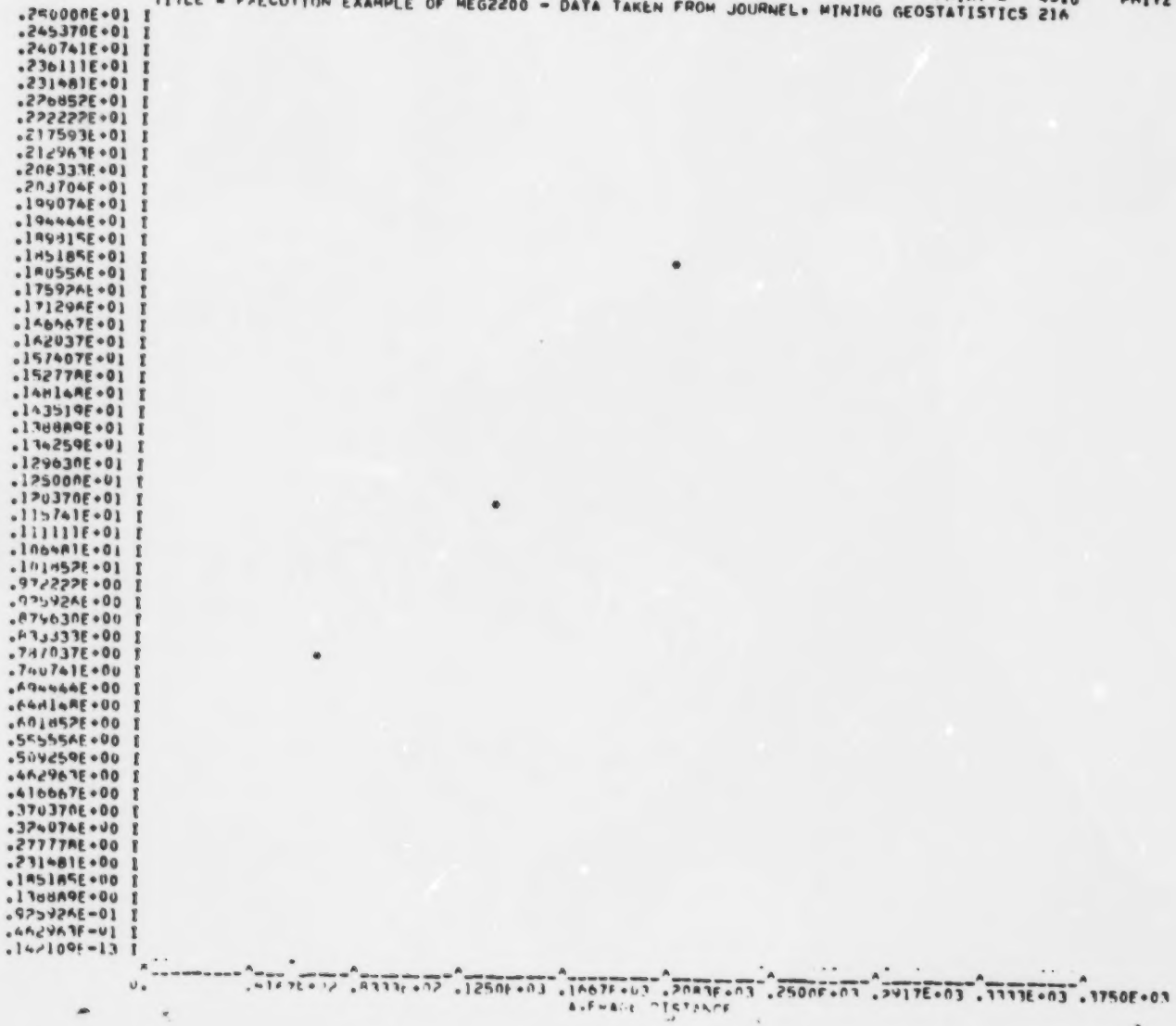


NAME OF VARIABLE = VARIABLE / DRIFT / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 45.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 214

NAME OF VARIABLE = VARIABLE / RELATIVE VARIOGRAM / TOTAL OPENING OF SECTOR = 2.0
PHIXY = 45.0 PHIYZ = 0.0

TITLE = EXECUTION EXAMPLE OF MEG2200 - DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS 21A



REFERENCES

1. Sabourin, R.L., "Program MEG2010 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-102(TR), CANMET, Energy, Mines and Resources Canada; 1982.

2. Journel, A., Huijbregts, Ch. J., "Mining geostatistics"; Academic Press; 1978.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

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PROGRAM MEG2250 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin

Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal reporting purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

Ce document est un rapport provisoire non révisé et rédigé principalement en vue de discussions et de documentations internes. Il ne représente nullement l'interprétation définitive de l'opinion du Centre canadien de la technologie des minéraux et de l'énergie (CANMET)

65pp

ENERGY RESEARCH PROGRAM

MINING RESEARCH LABORATORIES

DIVISION REPORT ERP/MRL 82-109(TR)

PROGRAM MEG2250 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2250 is to compute experimental variograms of a variable using rectangular regularizations. All pairs of observations belonging to the same relative rectangular pairs of block will be used to compute one experimental variogram value.

The calculated experimental variogram values will be printed on five tables representing a particular plane in space. When a two dimensional variable is used, only one table representing the horizontal plane is printed. A proportional effect study can also be performed by the program.

The input file of MEG2250 is provided by MEG2010, MEG2040 or by the user. The output results of MEG2250 can be stored on a file so that the experimental variograms can be graphically displayed on a calcomp plotter or so that it can be used as an input file of MEG2275 which will find the best theoretical variogram model.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2250
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RESERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2250 est de calculer les variogrammes expérimentaux d'une variable en utilisant des régularisations rectangulaires. Toutes les paires d'observations appartenant relativement à la même paire de blocs rectangulaires seront utilisées afin de calculer un point du variogramme expérimental. Les valeurs du variogramme expérimental seront imprimées sur cinq tableaux représentant chacun un certain plan de l'espace. Lorsqu'une variable bi-dimensionnelle est utilisée, alors un seul tableau représentant le plan horizontal sera imprimé. Une étude de l'effet proportionnel peut aussi être fournie par le programme.

Le fichier d'entrée de MEG2250 est fourni par MEG2010, MEG2040 ou par l'utilisateur. Les résultats de sortie de MEG2250 peuvent être enregistrés sur un fichier pour que les variogrammes expérimentaux soient dessinés à l'aide d'un traceur Calcomp ou pour qu'ils soient utilisés comme fichier d'entrée du programme MEG2275 qui trouvera le meilleur modèle théorique de variogramme.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2250(TPFE,X,Y,Z,GAMD,GAMF,GAMM,NP,VARIO,DERIV,DVAR,
     -                   NOMB,DDER,PI,NN,DIST,GAMR,VARS,IGA,IGB,AMOY,
     -                   DVAREL,BMOY,VMOY,NMOY,IIIX,JJJY,KKKZ,
     -                   K3,K4,K5,K6,K7,K8,K9,K11,K12,K13,K14,K15,K16)
C*
C*
C*************************************************************************
C*                                                                       *
C*                                                                       *
C******GENERAL DESCRIPTION                                               *
C*                                                                       *
C*     MEG2250 COMPUTES THE EXPERIMENTAL SEMI-VARIOGRAM OF A TWO OR      *
C*     THREE DIMENSIONAL VARIABLE. THE POSITION OF ALL OBSERVATIONS      *
C*     (SAMPLES) ARE IDENTIFIED BY THEIR BLOCK INDICES (IX,JY,KZ).       *
C*     THESE INDICES ARE DETERMINED BY A REFERENCE POINT (XREF,YREF,     *
C*     ZREF) AND BLOCK DIMENSIONS (XD,YD,ZD). ALL PAIRS OF OBSERVATIONS  *
C*     HAVING THE SAME RELATIVE DIFFERENCES IN INDICES WILL BE USED      *
C*     TO COMPUTE THE EXPERIMENTAL SEMI-VARIOGRAM FOR THAT CONFIGURA-    *
C*     TION OF BLOCKS. THE CALCULATED EXPERIMENTAL SEMI-VARIOGRAM        *
C*     VALUES WILL BE PRINTED ON A TABLE REPRESENTING A PARTICULAR       *
C*     PLANE. WHEN A TWO-DIMENSIONAL VARIABLE IS USED, ONLY ONE TABLE    *
C*     REPRESENTING THE X/Y PLANE IS PRINTED. WHEN A THREE-DIMENSIONAL   *
C*     VARIABLE IS USED, FIVE TABLES ARE PRINTED (PLANES  X/Y,           *
C*     X/Z, (X+45)/Z, Y/Z, AND (X-45)/Z RESPECTIVELY).  EACH TABLE       *
C*     CONTAINS EXPERIMENTAL SEMI-VARIOGRAM VALUES, AVERAGE DRIFT,       *
C*     RELATIVE SEMI-VARIOGRAM, AVERAGE DISTANCE BETWEEN PAIRS, AND      *
C*     NUMBER OF PAIRS USED FOR EACH BLOCK CONFIGURATION.                *
C*     A PROPORTIONAL EFFECT STUDY IS DONE BEFORE CALCULATING EXPERI-    *
C*     MENTAL SEMI- VARIOGRAMS. THE COMPUTED PROPORTIONAL EFFECT         *
C*     COEFFICIENTS (A0,AA) WILL BE USED TO CALCULATE THE RELATIVE       *
C*     VARIOGRAM.                                                        *
C*     DATA REQUIRED FOR EXECUTION IS READ FROM TAPE50 (PFNI). GRAPHIC   *
C*     VALUES ARE STORED ON TAPE52 (PFNO) FOR FURTHER PROCESSING BY      *
C*     PROGRAM MEG2275.                                                  *
C*     THIS PROGRAM USES VARIABLE DIMENSIONS. MEG2250 IS WRITTEN         *
C*     IN CDC FORTRAN LEVEL 4.8 AND WAS CREATED BY RAYMOND SABOURIN      *
C*     (EMR,CANMET,MRL),MAY 1982.                                        *
C*                                                                       *
C*************************************************************************
C*                                                                       *
C*                                                                       *
C*************************************************************************
C*                                                                       *
C*                                                                       *
C******OPTIONS READ ON INPUT                                             *
C*                                                                       *
C*     CARD 1 - AMIN,AMAX,ALFA,BETA,IDEF                                 *
C*              FORMAT READ IS (4F10.0,A10)                              *
C*          AMIN,AMAX - LOWER AND UPPER LIMITING VALUES OF STUDIED       *
C*                      VARIABLES ARE REJECTED.                          *
C*                      IF UNSPECIFIED, ALL VALUES GREATER THAN ZERO ARE *
C*                      USED!                                            *
C*                      IF ONLY AMIN IS SPECIFIED, ALL VALUES GREATER THAN *
C*                      AMIN WILL BE KEPT!                               *
C*          ALFA    - ROTATION OF COORDINATES IN THE X/Y PLANE, BLOCKS    *
C*                      WILL BE DEFINED WITH RESPECT TO THE SPECIFIED     *
C*                      REFERENCE POINT AFTER COORDINATES HAVE BEEN       *
```

```
C*                    ROTATED.  IN THIS NEW SYSTEM, THE USER MAY LIMIT    *
C*                    THE REGION OF STUDY BY SPECIFYING BLOCK RANGES      *
C*                    ALONG EACH AXIS (IR.GT.0).                          *
C*          BETA    - ROTATION OF COORDINATES IN THE Y/Z PLANE AFTER       *
C*                    THE ALFA ROTATION HAS BEEN APPLIED;                 *
C*                    N.B. WHEN ALFA.NE.0.0 OR BETA.NE.0.0, THE IR        *
C*                    REGIONS OF STUDY MUST BE SPECIFIED ACCORDING BLOCK  *
C*                    RANGES IN THE ROTATED COORDINATE SYSTEM.            *
C*                    POSITIVE VALUES OF ALFA AND BETA REPRESENT          *
C*                    COUNTER-CLOCKWISE ROTATIONS (AND VICE VERSA).       *
C*          IDEF    - VARIABLE IDENTIFIER (TEN CHARACTERS);               *
C*                    IDEF SHOULD BE THE NAME OF THE VARIABLE (TPFE) FOR  *
C*                    WHICH VARIOGRAMS ARE COMPUTED;                      *
C*                    DEFAULT IS 10H URANIUM  ;                           *
C*                                                                        *
C*       CARD 2 - NX3,NY3,NZ3,IR,IP,N9,N11,IPRNT,IREL,IGLOG,ISTOP,N3X,    *
C*                N3Y,N3Z;                                                *
C*                FORMAT READ IS (16I5);                                  *
C*       NX3,NY3,NZ3 - NUMBER OF STEPS (INCLUDING THE ORIGIN) FOR WHICH   *
C*                     GAMMA(H) IS TO BE CALCULATED ALONG EACH OF THE     *
C*                     THREE RESPECTIVE AXES (NZ3 IS SET TO ZERO          *
C*                     WHEN TWO DIMENSIONS ARE USED);                     *
C*          IR      - NUMBER OF REGIONS TO BE ANALYZED;                   *
C*                    IF IR.EQ.0, ALL DATA ARE ACCEPTED WITH RESPECT      *
C*                    TO THEIR SPATIAL COORDINATES;                       *
C*                    IF IR.GT.0, ONLY THE SAMPLE DATA WITHIN THE IR      *
C*                    REGIONS SPECIFIED BY OPTION CARD 5 WILL BE USED     *
C*                    FOR THE VARIOGRAM CALCULATIONS.                     *
C*          IP      - OPTION WHICH DETERMINES DIMENSIONS TO BE USED;      *
C*                    IF IP.EQ.2, TWO DIMENSIONS ARE USED (X/Y PLANE);    *
C*                    IF IP.EQ.3, THREE DIMENSIONS USED;                  *
C*          N9      - OPTION PERMITTING A LOGARITHMIC TRANSFORMATION      *
C*                    OF THE VARIABLE; IF N9=1, LOGARITHMIC VALUES ARE    *
C*                    USED; OTHERWISE N9=0.                               *
C*          N22     - FIELD LENTGH TO BE USED IN FORMAT FM2 AND FM3.       *
C*                    N11=130/N22 AND IS THE MAXIMUM NUMBER OF POINTS PER *
C*                    LINE OF OUTPUT. WHEN UNSPECIFIED, A DEFAULT VALUE   *
C*                    OF 13 IS USED FOR N22.                              *
C*                    THIS VALUE CORRESPONDS WITH THE DEFAULTS FOR FM2    *
C*                    AND FM3.                                            *
C*          IPRNT   - PRINTING OPTION OF INPUT DATA VALUES. WHEN IPRNT=0, *
C*                    THESE VALUES ARE NOT PRINTED.  WHEN A ROTATION      *
C*                    OCCURS, PRINTED COORDINATE VALUES ARE THOSE         *
C*                    OBTAINED AFTER ROTATION (ALFA.NE.0.0 OR             *
C*                    BETA.NE.0.0);                                       *
C*          IREL    - OPTION DETERMINING THE CHOICE OF RELATIVE VARIO-     *
C*                    GRAM TO BE USED; IF IREL=1, THE LOCAL VARIANCE IS   *
C*                    CALCULATED BY THIS FORMULA (A0+AA*(LOCAL MEAN)**2). *
C*                    A0 AND AA ARE EITHER PROVIDED BY THE USER OR COMPU- *
C*                    TED BY THE PROGRAM. THE LOCAL VARIANCE IS THEN USED *
C*                    WHEN CALCULATING RELATIVE VARIOGRAMS.               *
C*                    OTHERWISE, IREL=0 AND THE AVERAGE OF PAIRED MEANS   *
C*                    WILL BE USED INSTEAD OF THE LOCAL MEAN IN THE ABOVE *
C*                    FORMULA TO COMPUTE THE LOCAL VARIANCE;              *
C*          IGLOG   - IF IGLOG=1, ADDITIONNAL GRAPHS USING LOGARITHMIC    *
C*                    DISTANCES ARE ALSO PRINTED (FOR ABSOLUTE AND        *
C*                    RELATIVE VARIOGRAMS);                               *
```

```
C*                  IF IGLOG=0, OPTION IS NOT USED;                      *
C*        ISTOP  - OPTION WHICH PERMITS USER TO TERMINATE EXECUTION;     *
C*                  IF ISTOP=0, OPTION IS NOT USED;                      *
C*                  IF ISTOP=1, PROGRAM TERMINATES AFTER ANALYZING       *
C*                  THE PROPORTIONAL EFFECT MODEL (IF N9=0) OR AFTER     *
C*                  SORTING DATA (N9=1);                                 *
C*                  IF ISTOP=2, EXECUTION TERMINATES AFTER PRINTING      *
C*                  THE TABLES OF VARIOGRAM RESULTS;                     *
C*        N3X,N3Y,N3Z - NUMBER OF STEPS ALONG EACH AXIS TO BE USED IN *
C*                  CALCULATING THE PROPORTIONAL EFFECT COEFFICIENT(AA)*
C*                  DEFAULTS ARE SET AT ONE; THESE VALUES ARE NOT USED *
C*                  WHEN N9=1; THIS OPTION IS USED TO REPEAT THE CALCU-*
C*                  LATION OF A0 AND AA N3X*N3Y*N3Z TIMES WHEN THE       *
C*                  NUMBER OF SAMPLES IS LIMITED.                        *
C*                  N.B. N3X.LE.(2*NX3-1)                                *
C*                       N3Y.LE.(2*NY3-1)                                *
C*                       N3Z.LE.(2*NZ3-1);                               *
C*                                                                       *
C*     CARD 3 - XREF,YREF,ZREF,XD,YD,ZD                                  *
C*              FORMAT READ IS (8F10.3)                                  *
C*        XREF,YREF,ZREF - COORDINATES OF REFERENCE POINT;               *
C*        XD,YD,ZD - RESPECTIVE DIMENSIONS OF BLOCK;                     *
C*                  WHEN ALFA AND/OR BETA  ARE NOT EQUAL TO ZERO,        *
C*                  THE REFERENCE POINT WILL BE USED AS A PIVOT AND      *
C*                  THE NEW GRID SYSTEM, AFTER ALL ROTATIONS HAVE        *
C*                  BEEN PERFORMED, WILL CONSIST OF BLOCKS WITH          *
C*                  RESPECTIVE DIMENSIONS XD,YD AND ZD.                  *
C*                  THESE DIMENSIONS (XD,YD,ZD) COULD BE CONSIDERED AS *
C*                  THE RESPECTIVE DISTANCE CLASSES ALONG X, Y AND       *
C*                  Z-AXIS.                                              *
C*                                                                       *
C*     CARD 4 - PX,PY,PZ,GRMIN,GRMAX,VRMIN,VRMAX,A0,AA                   *
C*              FORMAT READ IS (7F10.0,2F5.0)                            *
C*                  CARD IS NOT READ IF N9=1.                            *
C*                  THIS CARD CONTAINS PARAMETERS NECESSARY TO STUDY     *
C*                  THE PROPORTIONAL EFFECT. THE FIELD OF STUDY          *
C*                  (2 OR 3-DIMENSIONAL) IS DIVIDED INTO BLOCKS          *
C*                  OF DIMENSIONS PX,PY AND PZ. EACH OF THESE BLOCKS     *
C*                  IS DESIGNATED AS A LOCAL ZONE OF STUDY. FOR          *
C*                  EACH LOCAL ZONE, THE ARITHMETIC AVERAGE AND VARIAN-*
C*                  CE OF THE VARIABLE ARE COMPUTED. LOCAL ZONES WITH    *
C*                  LESS THAN 3 SAMPLES DO NOT PARTICIPATE IN THE        *
C*                  PROPORTIONAL EFFECT STUDY. LOCAL ZONES ARE ALSO      *
C*                  REJECTED WHEN THE ARITHMETIC AVERAGE AND VARIANCE    *
C*                  ARE RESPECTIVELY OUTSIDE THE RANGE GRMIN-GRMAX       *
C*                  AND VRMIN-VRMAX. ALL ACCEPTED AVERAGES AND           *
C*                  VARIANCES WILL BE USED TO ESTIMATE PARAMETERS A0     *
C*                  AND AA OF THE FOLLOWING EQUATION: VAR=A0+AA*AVE**2,*
C*                  WHERE A0 AND AA ARE THE COEFFICIENTS OF THE PROPOR-*
C*                  TIONAL EFFECT BETWEEN THE LOCAL VARIANCE AND THE     *
C*                  LOCAL ARITHMETIC AVERAGE WITHIN A ZONE DEFINED       *
C*                  BY PX,PY,PZ.                                         *
C*                  THE CHOSEN PROPORTIONAL EFFECT FUNCTION(A PARABOLA)*
C*                  WILL BE PLOTTED ON A GRAPHIC WITH ALL THE LOCAL      *
C*                  AVERAGE AND VARIANCE VALUES.                         *
C*     PX,PY,PZ   - RESPECTIVE DIMENSIONS OF LOCAL ZONES TO CALCULATE    *
C*                  LOCAL ARITHMETIC AVERAGE AND VARIANCE. WHEN          *
```

```
C*                    UNSPECIFIED, DEFAULT VALUES WILL BE                    *
C*                         PX=(2*(NX3-1)*XD)                                 *
C*                         PY=(2*(NY3-1)*YD)                                 *
C*                         PZ=(2*(NZ3-1)*ZD)                                 *
C*          GRMIN,GRMAX - LOWER AND UPPER LIMIT FOR LOCAL AVERAGE            *
C*                    VALUES OF THE VARIABLE.(INCLUDED)                      *
C*                    IF UNSPECIFIED ALL LOCAL AVERAGES ARE ACCEPTED.        *
C*                    IF ONLY GRMIN IS SPECIFIED, ALL LOCAL AVERAGES .GE.    *
C*                    GRMIN ARE ACCEPTED. GRMIN AND GRMAX DO NOT HAVE        *
C*                    TO BE SPECIFIED WHEN LOGARITMIC VARIOGRAMS ARE         *
C*                    COMPUTED (N9=1).                                       *
C*          VRMIN,VRMAX - LOWER AND UPPER LIMIT VALUES FOR LOCAL VARIANCES   *
C*                    (INCLUDED).                                            *
C*                    IF UNSPECIFIED, ALL LOCAL VARIANCES ARE ACCEPTED.      *
C*                    IF ONLY VRMIN IS SPECIFIED, ALL LOCAL VARIANCES        *
C*                    GREATER THAN VRMIN ARE ACCEPTED. VRMIN AND VRMAX       *
C*                    DO NOT HAVE TO BE SPECIFIED WHEN LOGARITHMIC           *
C*                    VARIOGRAMS ARE COMPUTED. (N9=1)                        *
C*               A0,AA - COEFFICIENTS TO BE USED IN THE PROPORTIONAL EFFECT   *
C*                    MODEL. WHEN A0 AND AA ARE SPECIFIED (I.E.A0 AND AA     *
C*                    .NE.0.0) THESE PARAMETERS WILL BE USED TO CALCULATE    *
C*                    RELATIVE VARIOGRAMS INSTEAD OF USING THE VALUES        *
C*                    CALCULATED FROM THE PROPORTIONAL EFFECT STUDY.         *
C*                                                                           *
C*          CARD 5 -  THESE CARDS ARE READ ONLY IF IR IS GREATER THAN        *
C*                    ZERO. IR MUST ALWAYS BE LESS THAN OR EQUAL TO 10.      *
C*                    TWO FORMATS ARE AVAILABLE FOR THIS CARD.               *
C*                    FIRST FORMAT IS USED WHEN ALFA AND BETA ARE EQUAL      *
C*                    TO ZERO. THE VARIABLES READ ARE:                       *
C*                              (XMIN(I),XMAX(I),YMIN(I),YMAX(I),            *
C*                               ZMIN(I),ZMAX(I),I=1,IR)                     *
C*                    FORMAT READ IS (6F10.3)                                *
C*                    IR CARDS ARE READ AND THE VALUES ARE THE LOWER         *
C*                    AND UPPER LIMITS FOR EACH REGION ALONG X,Y,Z           *
C*                    THE SECOND FORMAT IS USED WHEN ALFA AND BETA .NE.0.    *
C*                    THE VARIABLES READ ARE:                                *
C*                              (IMIN(I),IMAX(I),JMIN(I),JMAX(I),            *
C*                               KMIN(I),KMAX(I),I=1,IR)                     *
C*                    FORMAT READ IS (6I10)                                  *
C*                    IR CARDS ARE READ AND THE VALUES ARE BLOCK INDICES     *
C*                    LIMITS DEFINING EACH STUDIED REGION IN A ROTATED       *
C*                    COORDINATE SYSTEM. LIMITS ARE INCLUDED. VALUE          *
C*                    OF IMIN,IMIN OR KMIN MUST BE AT LEAST EQUAL TO ONE.    *
C*                                                                           *
C*          CARD 6 - FM1                                                     *
C*                   FORMAT READ IS (8A10);                                  *
C*               FM1    - FORMAT TO BE USED FOR READING BLOCK DATA FROM      *
C*                        TAPE 50;                                           *
C*                        DEFAULT VALUE IS:                                  *
C*                        (4X,I4,30X,3F14.3,15X,F14.4,I1)                    *
C*                        THIS FORMAT MAY BE USED TO STUDY VARIABLE VALUES OF*
C*                        EQUAL LENGTH SEGMENTS CREATED BY MEG2040.          *
C*                                                                           *
C*               READING STATEMENT IS:                                       *
C*               READ(50,FM1) MEGNUM,X(M),Y(M),Z(N1),TPFE(M),IR1             *
C*                        MEGNUM - SAMPLE IDENTIFIER (INTEGER);              *
C*                        X(M),Y(M),Z(N1) - SAMPLE COORDINATES (Z IS         *
```

```
C*                        NEGLECTED IF IP=2)!
C*                  TPFE(M) - VALUE OF ANALYZED VARIABLE!
C*                  IR1     - REJECTION OPTION (REJECTION OCCURS WHEN
C*                            IR1=1)!
C*                          IR1=1)!
C*
C*      CARD 7 - TITRE
C*               FORMAT READ IS (8A10)!
C*           TITRE  - GENERAL TITLE FOR THE VARIOGRAMS GRAPHICS.
C*
C*      THE NEXT TWO CARDS ARE OPTIONNAL.  IF UNSPECIFIED, DEFAULT
C*      VALUES WILL BE APPLIED.
C*
C*      CARD 8 - FM2
C*               FORMAT READ IS (8A10)!
C*           FM2    - FORMAT TO BE USED TO PRINT EXACT GRAPHICAL VALUES
C*                    BEFORE PRINTING EACH GRAPHIC!
C*
C*           PRINTING STATEMENT IS!
C*           PRINT FM2,L,(X(I),I=I1,I2),L,(Y(I),I=I1,I2),L,(N(I),I=I1,I2)
C*                    WHERE L IS THE NUMBER OF PRINTED VALUES ON A LINE
C*                    (L=I2-I1+1) WHICH CORRESPONDS TO AN = SIGN IN THE
C*                    GIVEN FORMAT (FM2)!
C*                    L.LE.N11. X(I) AND Y(I) ARE RESPECTIVELY THE
C*                    DISTANCE AND THE VARIOGRAM (OR DRIFT) VALUES.
C*                    N(I) IS THE NUMBER OF SAMPLE PAIRS ASSOCIATED WITH
C*                    X(I) AND Y(I)
C*                    DEFAULT FORMAT IS!
C*                    FM2=(1X,=F13.3/1X,=F13.2/1X,=I13/)
C*
C*      CARD 9 - FM3
C*               FORMAT READ IS (8A10)
C*           FM3    - FORMAT USED FOR PRINTING BLOCK SECTIONS!
C*
C*           PRINTING STATEMENT IS!
C*           PRINT FM3, L,(A(I),I=I1,I2),L,(B(I),I=I1,I2),
C*                      L,(D(I),I=I1,I2),L,(C(I),I=I1,I2),
C*                      L,(K(I),I=I1,I2)
C*           WHERE L (THE NUMBER OF BLOCKS ON A LINE)
C*           (L=I2-I1+1) WHICH CORRESPONDS TO AN = SIGN IN THE
C*           GIVEN FORMAT (FM3), A(I),
C*           B(I), D(I), AND C(I) ARE RESPECTIVELY!  ABSOLUTE VARIOGRAM,
C*           DRIFT, RELATIVE VARIOGRAM, AND AVERAGE DISTANCE.
C*           D IS NOT PRINTED WHEN N9=1.
C*           N.B. L.LE.N11!
C*           E.G. (1X,=F13.2/1X,=F13.2/1X,=F13.2/1X,=F13.2/1X,=I13/)
C*           WITH N11=10 AND N9=0!
C*           DEFAULT FORMAT IS!
C*           FM3=(1X,=F13.3/1X,=F13.3/1X,=F13.3/1X,=F13.2/1X,=I13/)
C*                WHEN N9=0!
C*           FM3=(1X,=F13.3/1X,=F13.3/1X,=F13.2/1X,=I13/) WHEN N9=1!
C*
C*      FORMATS FM2 AND FM3 SHOULD BE SIMILAR, WITH ONE OR TWO LINES
C*      OF FM3 OMITTED IN FM2.
C*
C*      N.B. ALL OPTIONS READ ARE PRINTED ON OUTPUT.
C*
```

```
C*****************************************************************
C*                                                               *
C*                                                               *
C*****************************************************************
C*                                                               *
C*                                                               *
C******OUTPUT DISPOSITION                                        *
C*                                                               *
C*     SECTION 1 - OPTIONS APPLIED ARE PRINTED;                  *
C*     SECTION 2 - DATA ARE PRINTED FOLLOWED BY SOME BASIC       *
C*                 STATISTICS;                                   *
C*     SECTION 3 - A PROPORTIONAL EFFECT STUDY IS PERFORMED AND A*
C*                 GRAPHIC IS PRINTED SHOWING THE LOCAL VARIANCES*
C*                 VERSUS LOCAL MEANS;                           *
C*     SECTION 4 - COMPUTED VARIOGRAMS TABLES ARE PRINTED;       *
C*     SECTION 5 - A TABLE OF GRAPHICAL VALUES FOLLOWED BY A GRAPHIC*
C*                 GIVING A DIRECTIONAL EXPERIMENTAL VARIOGRAM OR*
C*                 DRIFT;                                       *
C*     SECTION 6 - A TABLE OF GRAPHICAL VALUES FOLLOWED BY A GRAPHIC*
C*                 GIVING EXPERIMENTAL AVERAGE VARIOGRAMS OR DRIFTS;*
C*                                                               *
C*****************************************************************
C*                                                               *
C*                                                               *
C*****************************************************************
C*                                                               *
C*                                                               *
C******DESCRIPTION OF PARAMETERS                                 *
C*                                                               *
C*     X, Y, Z - ARRAYS CONTAINING THREE-DIMENSIONAL COORDINATES OF*
C*               SAMPLES;                                        *
C*     GAMD    - ARRAY CONTAINING AVERAGE DISTANCES;             *
C*     GAMF    - ARRAY CONTAINING VARIOGRAM VALUES;              *
C*     GAMM    - ARRAY CONTAINING DRIFT VALUES;                  *
C*     GAMR    - ARRAY CONTAINING RELATIVE VARIOGRAM VALUES;     *
C*     NP      - ARRAY CONTAINING THE NUMBER OF SAMPLE POINTS USED TO*
C*               EVALUATE RESPECTIVE VARIOGRAM VALUES;           *
C*     PI, VARIO, DERIV - ARRAYS USED FOR TEMPORARY STORAGE OF   *
C*                        ABSCISSA AND ORDINATE VALUES FOR GRAPHS;*
C*     NN      - ARRAY USED FOR TEMPORARY STORAGE OF NP;         *
C*     DVAR, DDER, DIST, NOMB - ARRAYS USED FOR STORAGE OF VALUES*
C*               ASSOCIATED WITH AVERAGE VARIOGRAM;              *
C*     TPFE    - ARRAY CONTAINING THE VARIABLE TO BE ANALYSED;   *
C*     AMOY    - ARRAY CONTAINING LOCAL MEANS;                   *
C*     VABS    - USED FOR TEMPORARY STORAGE OF RELATIVE VARIOGRAM*
C*               VALUES THAT ARE USED ON GRAPHS;                 *
C*     DVAREL  - USED FOR STORAGE OF AVERAGE RELATIVE VARIOGRAM VALUES;*
C*     IGA, IGR - ARRAYS USED BY MEG2251 FOR STORAGE OF PRINTING *
C*               LOCATIONS;                                      *
C*     BMOY,VMOY,NMOY - ARRAYS USED TO DETERMINE A0 AND AA, BMOY AND*
C*               VMOY CONTAIN RESPECTIVELY THE LOCAL AVERAGES AND VARI-*
C*               ANCES, A0 AND AA ARE CALCULATED FROM A LINEAR   *
C*               REGRESSION.                                     *
C*     IIIX,JJJY,KKKZ - ARRAYS USED FOR TEMPORARY STORAGE OF ZONE*
C*               INDICES;                                        *
C*                                                               *
C*****************************************************************
```

```
C*
C*
C*****************************************************************************
C*
C******VARIABLE DIMENSIONS
C*
C*      K3 - NUMBER OF SAMPLES;
C*      K4 - NUMBER OF SAMPLES WHEN THREE DIMENSIONS ARE USED,
C*           OTHERWISE K4=1 FOR A TWO-DIMENSIONAL STUDY;
C*      K5 - GREATEST NUMBER OF COLUMNS TO BE FOUND ON EACH
C*           TABLE (K5=MAX0(NX3,NY3));
C*      K6 - GREATEST NUMBER OF BLOCK-LINES PER TABLE
C*           (K6=2*MAX0(NY3,NZ3)-1);
C*      K7 - NUMBER OF TABLES TO BE PRINTED (K7=1 FOR TWO DIMENSIONS,
C*           K7=5 FOR THREE DIMENSIONS);
C*      K8 - GREATEST NUMBER OF POINTS ON GRAPH
C*           (K8=MAX0(NX3,NY3,NZ3)+2);
C*      K9 - TWO MORE THAN THE NUMBER OF LOCAL ZONES USED TO CALCULATE
C*           A0 AND AA;
C*           IF N9=1, THEN K9=1.
C*      K11 - K11=MAX0(K8,K9);
C*      K12 - K12=K3 IF IREL=1, OTHERWISE K12=1;
C*      K13 - K13=K8 IF N9=0, OTHERWISE K13=1;
C*      K14 - K14=K7 IF N9=0, OTHERWISE K14=1;
C*      K15 - K15=K5 IF N9=0, OTHERWISE K15=1;
C*      K16 - K16=K6 IF N9=0, OTHERWISE K16=1;
C*
C*****************************************************************************
C*
C*
C*****************************************************************************
C*
C******FILES USED
C*
C*      TAPE1 - INPUT DATA CARDS;
C*      TAPE50 - INPUT DATA FILE (PFNI), (FROM MEG2010, MEG2040,
C*               MEG2050 OR USER CREATED FILE) -SEE READING STATEMENT
C*               IN OPTION CARD 6 ABOVE;
C*      TAPE51 - OUTPUT LISTING (SEE OUTPUT DISPOSITION ABOVE);
C*      TAPE52 - STORAGE OF RESULTS (PFNO)
C*               IF N9 EQUAL 0, RECORDING STATEMENT IS;
C*                     WRITE(52,1270) (DIST(I),DVAR(I),DDER(I),
C*                                     DVAREL(I),NOMB(I),I=1,N3)
C*                 1270 FORMAT(4E15.5,I10)
C*               IF N9 NOT EQUAL 0, RECORDING STATEMENT IS;
C*                     WRITE(52,1160) (DIST(I),DVAR(I),DDER(I),
C*                                     NOMB(I),I=1,N3)
C*                   1160 FORMAT(3E15.5,I10)
C*
C*****************************************************************************
C*
C*****************************************************************************
C*
C******EXECUTION
C*
C*      H2250,CM77000,IO500,T100,P2.
C*      ACCOUNT,*****,PW=******.
```

```
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.                  *
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2250,                              *
C*      PFNI=                    , PERMANENT FILE NAME OF INPUT DATA FILE.*
C*                                 (PFNI CAN BE THE OUTPUT FILE OF MEG2010*
C*                                 OR MEG2040) TAPE50.                  *
C*      PFNO=                    , PERMANENT FILE NAME OF MEG2250 OUTPUT  *
C*                                 FILE (TAPE52). Q3=K3,Q4=K4 ETC... - SEE*
C*                                 VARIABLE DIMENSIONS.                 *
C*                                                                      *
C***********************************************************************
C*                                                                      *
C***********************************************************************
C*                                                                      *
C******DECLARATION OF VARIABLES                                         *
C*                                                                      *
C***********************************************************************
C*                                                                      *
C******VARIABLES DIMENSIONED WITHIN GEM2250                             *
C*                                                                      *
      REAL     TPFE(K3),X(K3),Y(K3),Z(K4),GAMD(K7,K5,K6),
     -         GAMF(K7,K5,K6),GAMM(K7,K5,K6),VARIO(K8),DERIV(K8),
     -         DVAR(K8),DDER(K8),PI(K8),DIST(K8),GAMR(K14,K15,K16)
      REAL     VABS(K13),AMOY(K12),DVAREL(K13),BMOY(K9),VMOY(K9),
     -         FM1(8),FM2(8),FM3(8),XMIN(10),XMAX(10),YMIN(10),YMAX(10),
     -         ZMIN(10),ZMAX(10),CROSS(13)
      INTEGER  NP(K7,K5,K6),NOMB(K8),NN(K8),IGA(K11),IGB(K11),NMOY(K9),
     -         IMIN(10),IMAX(10),JMIN(10),JMAX(10),KMIN(10),KMAX(10),
     -         TITRE(16),NXYZ(5),NYXZ(5),IIIX(K9),JJJY(K9),KKKZ(K9)
C*                                                                      *
C******COMMON AREA FOR MEG2251                                         *
C*                                                                      *
      COMMON/REGRES/AA,BB,IND,A0
      COMMON/LAB/IDEF
C*                                                                      *
C*                                                                      *
C***********************************************************************
C*                                                                      *
C******MAIN BODY OF MEG2250                                             *
C*                                                                      *
C***********************************************************************
C*
C*
C******READ AND PRINT INPUT OPTIONS
C*
      FDIST(A,B,C,D,E,F)=SQRT((A-B)**2+(C-D)**2+(E-F)**2)
C*
C******CARD 1
C*
      READ 1080, AMIN,AMAX,ALFA,BETA,IDEF
C*
      IF(AMAX.EQ.0.0) AMAX=99999999.
      IF(IDEF.EQ.10H          ) IDEF=10H URANIUM
C*
C******CARD 2
C*
      READ 1090,NX3,NY3,NZ3,IR,IP,N9,N22,IPRNT,IREL,IGLOG,ISTOP,
     -          N3X,N3Y,N3Z
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

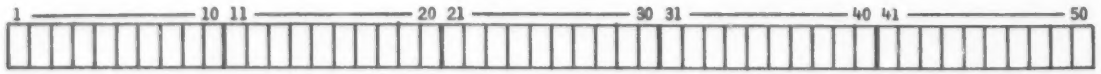
MEG2250 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 3
NAME _____

CARD NO. 1

AMIN, AMAX, ALFA, BETA, IDEF, FORMAT(4F10.0,A10)

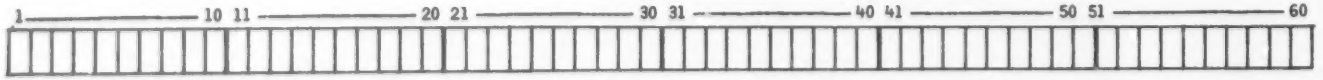


CARD NO. 2

NX3 NY3 NZ3 IR IP N9 N22 IPRNT IREL IGLOG ISTOP N3X N3Y N3Z FORMAT(16I5)

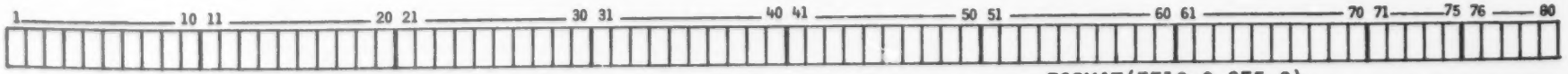
CARD NO. 3

XREF YREF ZREF XD YD ZD FORMAT(8F10.3)



CARD NO. 4

PX PY PZ GRMIN GRMAX VRMIN VRMAX AO AA



FORMAT(7F10.0,2F5.0)

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MEG2250 - OPTION CARDS

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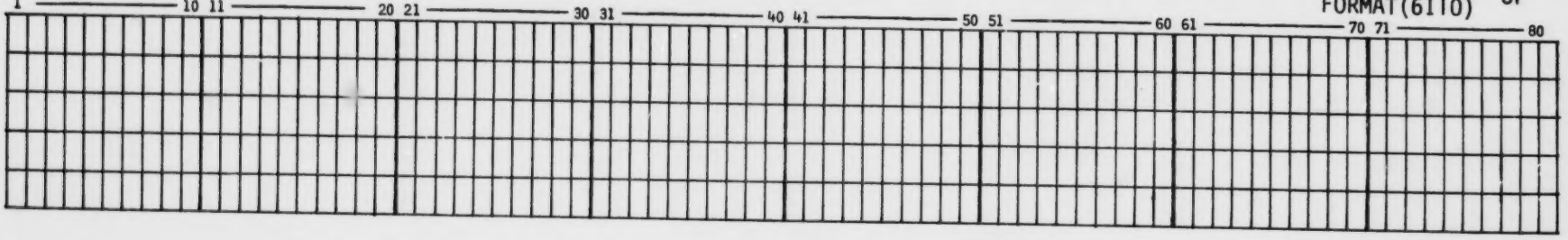
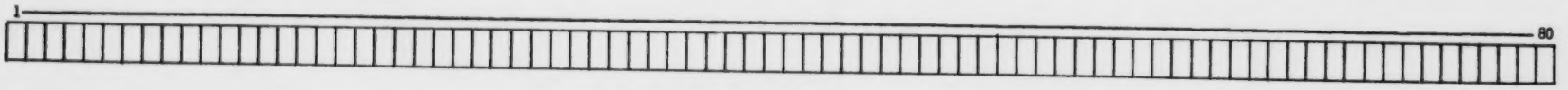
CARD NO. 5

(XMIN(I), XMAX(I), YMIN(I), YMAX(I), ZMIN(I), ZMAX(I), I=1,IR) FORMAT(6F10.3) or FORMAT(6I10)



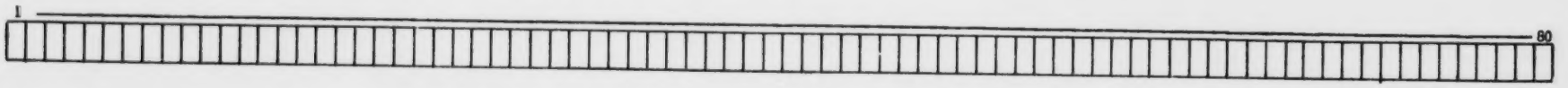
CARD NO. 6

(FM1(I),I=1,8) FORMAT(8A10)



CARD NO. 7

(TITRE(I),I=1,8) FORMAT(8A10)



MEG2250 - OPTION CARDS

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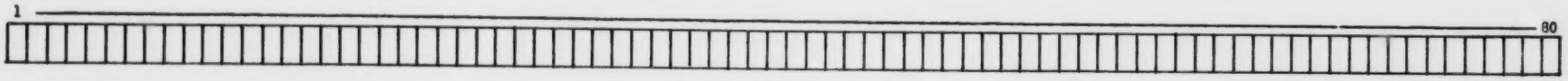
CARD NO. 8
(FM2(I),I=1,8) FORMAT(8A10)

CARD NO. 9
(FM3(I),I=1,8) FORMAT(8A10)



EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2250,
PFNI=                    ,(PERMANENT FILE NAME OF INPUT DATA FILE)
PFNO=                    ,(PERMANENT FILE NAME MEG2250 OUTPUT FILE)
Q3=      ,Q4=      ,Q5=      ,Q6=      ,Q7=      ,Q8=      ,Q9=      ,Q11=      ,Q12=      ,Q13=      ,Q14=      ,Q15=      ,Q16=      .
```

CHAPTER 3.0
EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2250 - OPTION CARDS

VERSION NO. 1
MAY, 1982

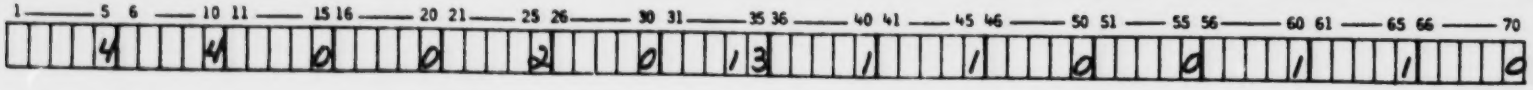
DATE 5-10-82
PAGE 1 OF 3
NAME RC

CARD NO. 1

AMIN, AMAX, ALFA, BETA, IDEF, FORMAT(4F10.0,A10)

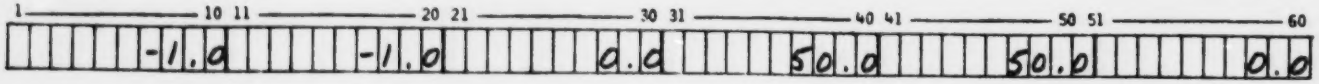
CARD NO. 2

NX3 NY3 NZ3 IR IP N9 N22 IPRNT IREL IGLOG ISTOP N3X N3Y N3Z FORMAT(16I5)



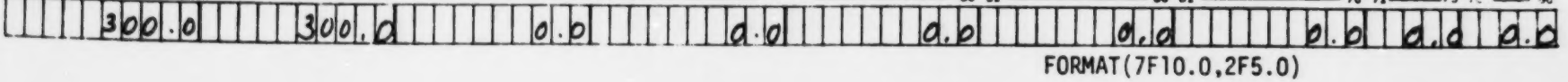
CARD NO. 3

XREF YREF ZREF XD YD ZD FORMAT(8F10.3)



CARD NO. 4

PX PY PZ GRMIN GRMAX VRMIN VRMAX AO AA



FORMAT(7F10.0,2F5.0)

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MEG2250 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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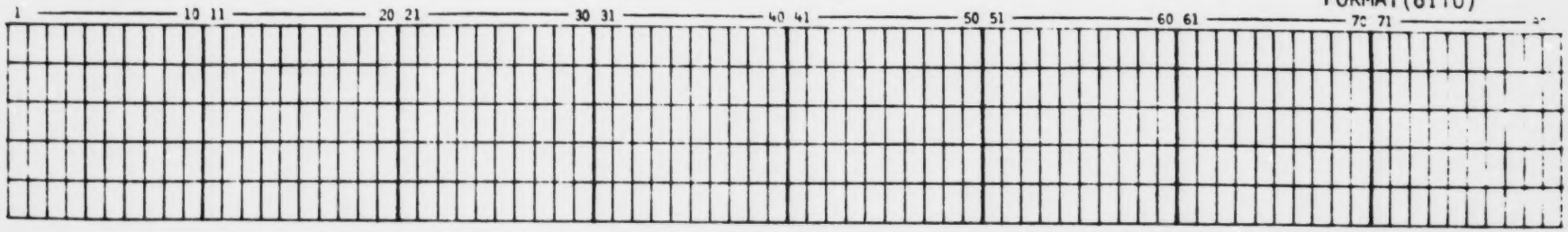
PAGE 2 OF 3
NAME RS

CARD NO. 5 (NOT USED)

(XMIN(I), XMAX(I), YMIN(I), YMAX(I), ZMIN(I), ZMAX(I), I=1,IR) FORMAT(6F10.3) or FORMAT(6I10)

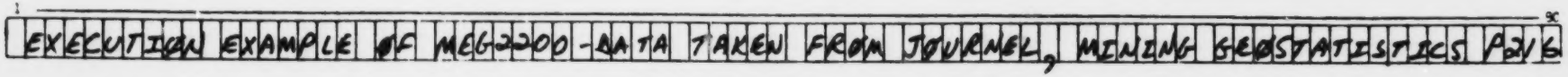


CARD NO. 6

(FM1(I),I=1,8) FORMAT(8A10)

CARD NO. 7

(TITRE(I),I=1,8) FORMAT(8A10)



MEG2250 - OPTION CARDS

VERSION NO. 1
MAY, 1982

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PAGE 3 OF 3
NAME RS

CARD NO. 8
(FM2(I),I=1,8) FORMAT(8A10)

```
1                                                                                80
(1X,F3.3/1X,F3.2/1X,I3/)
```

CARD NO. 9
(FM3(I),I=1,8) FORMAT(8A10)

```
1                                                                                80
(1X,F3.3/1X,F3.3/1X,F3.3/1X,F3.2/1X,I3/)
```

EXECUTION

17

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2250,
PFNI=MEG2200DATATEST,(PERMANENT FILE NAME OF INPUT DATA FILE)
PFNO=MEG2250DATATEST,(PERMANENT FILE NAME MEG2250 OUTPUT FILE)
Q3=50 ,Q4=1 ,Q5=5 ,Q6=10 ,Q7=1 ,Q8=10 ,Q9=25 ,Q11=25 ,Q12=50 ,Q13=10 ,Q14=1 ,Q15=5 ,Q16=10 .
```

```
      PROGRAM GFM2250(INPUT,OUTPUT,TAPE1=INPUT,TAPE50,TAPE51=OUTPUT,
     -                TAPE52)
      DIMENSION TPFE(50),X(50),Y(50),Z(1),
     -          GAMD(1,5,10),
     -          GAMM(1,5,10),NP(1,5,10),
     -          VARIO(10),DERIV(10),DVAR(10),NOMB(10),
     -        DDER(10),PI(10),NN(10),
     -          GAMF(1,5,10),DIST(10),
     -          GAMR(1,5,10),VABS(10),
     -          IGA(25),IGB(25),
     -          RMOY(25),VMOY(25),NMOY(25),
     -          AMOY(50),DVAREL(10),
     -          IIIX(25),JJJY(25),KKKZ(25)
C*     NUMBER OF SAMPLES
      K3=50
C*     IF THE VARIOGRAM IS MADE IN 3 DIMENSIONS THEN K4=K3,
C*                                              OTHERWISE K4=1
      K4=1
C*     GREATEST NUMBER OF COLUMNS TO BE FOUND ON EACH PLANE TABLE
C*     K5=MAX0(NX3,NY3)
      K5=5
C*     GREATEST NUMBER OF BLOCK-LINES PER PLANE
C*     K6=2*MAX0(NY3,NZ3)-1
      K6=10
C*     IF THE SAMPLES HAVE 3 DIMENSIONS K7=5
C*     IF THE SAMPLES HAVE 2 DIMENSIONS K7=1
      K7=1
C*     GREATEST NUMBER OF POINTS ON GRAPH
C*     K8=MAX0(NX3,NY3,NZ3)+2
      K8=10
C*     NUMBER OF DISTINCT ZONES (PLUS 2) TO BE USED IN CALCULATING
C*     AA AND RR: IF N9=1, THEN K9=1,
      K9=25
      K11=MAX0(K8,K9)
C*     K12=K3 IF IREL=1, OTHERWISE K12=1
      K12=50
C*     K13=K8 IF N9=0, OTHERWISE K13=1
      K13=10
C*     K14=K7 IF N9=0, OTHERWISE K14=1
      K14=1
C*     K15=K5 IF N9=0, OTHERWISE K15=1
      K15=5
C*     K16=K6 IF N9=0, OTHERWISE K16=1
      K16=10
      CALL MFG2250(TPFE,X,Y,Z,GAMD,GAMF,GAMM,NP,VARIO,DERIV,DVAR,NOMB,
     -             DDER,PI,NN,DIST,GAMR,VABS,IGA,IGB,AMOY,
     -             DVAREL,RMOY,VMOY,NMOY,IIIX,JJJY,KKKZ,
     -             K3,K4,K5,K6,K7,K8,K9,K11,K12,K13,K14,K15,K16)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	AMIN=	0.000	
	AMAX=	99999999.000	RANGE OF ALLOWABLE VALUES FOR STUDIED VARIABLE (LIMITS ARE EXCLUDED)!
	ALFA=	0.000	ROTATION ANGLE OF X AND Y AXES!
	BETA=	0.000	SUBSEQUENT ROTATION OF Y AND Z AXES!
	IDEF=	TEST	VARIABLE IDENTIFIER!
2	NX3=	4	
	NY3=	4	
	NZ3=	0	NUMBER OF STEPS +1, FOR WHICH THE EXPERIMENTAL VARIOGRAM IS TO BE CALCULATED ALONG EACH RESPECTIVE AXIS!
	IR=	0	NUMBER OF REGIONS TO BE ANALYZED (ALL SAMPLES ARE USED WHEN IR=0)!
	IT=	2	NUMBER OF DIMENSIONS TO BE USED!
	NO=	0	LOGARITHMIC OPTION! LOGARITHMIC VALUES ARE USED WHEN NO=1!
	NZ2=	13	FIELD LENGTH TO BE USED IN FORMAT FM2 AND FM3!
	IPRNT=	1	PRINTING OPTION. INPUT DATA VALUES ARE PRINTED WHEN IPRNT.NE.0!
	IREL=	1	RELATIVE VARIOGRAM OPTION. WHEN IREL=1, THE LOCAL MEAN IS USED! OTHERWISE, THE AVERAGE OF PAIRS MEAN IS USED.
	IGLOG=	0	OPTION WHICH CAUSES PRINTING OF ADDITIONNAL GRAPHS USING LOGARITHMIC DISTANCES (IGLOG=1)!
	ISTOP=	0	OPTION ALLOWING EARLY TERMINATION! ISTOP IS UNUSED WHEN EQUAL TO ZERO!
	NJX=	1	
	NJY=	1	
	NJZ=	0	RESPECTIVE NUMBER OF STEPS TO BE USED FOR THE PROPORTIONAL EFFECT MODEL ALONG EACH AXIS!
3	XREF=	-1.0000	
	YREF=	-1.0000	
	ZREF=	0.0000	COORDINATES OF REFERENCE POINT!
	XU=	50.0000	
	YU=	50.0000	
	ZU=	0.0000	DIMENSIONS OF BLOCKS!

```
4       PX=          300.00000
        PY=          300.00000
        PZ=            0.00000                    DIMENSIONS OF ZONES USED IN PROPORTIONAL EFFECT STUDY:

        GRMIN=         0.00000
        GRMAX=   999999.90000                     PERMISSIBLE RANGE OF LOCAL MEAN GRADES (INCLUDED):

        VRMIN=         0.00000
        VRMAX=       100.00000                    PERMISSIBLE RANGE OF LOCAL VARIANCES (INCLUDED):

        A0=            0.00000

        AA=            0.00000                    COEFFICIENTS FOR THE PROPORTIONAL EFFECT MODEL:

6       FM1=       (I5,4F10.1,I1)
                                                  INPUT DATA READING FORMAT:

7       TITRE=   EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
                                                  VARIOGRAM TITLE:

8       FM2=       (1X,=F13.3/1X,=F13.2/1X,=I13/)  GRAPHICAL DATA FORMAT:

9       FM3=       (1X,=F13.3/1X,=F13.3/1X,=F13.3/1X,=F13.2/1X,=I13/)
                                                  OUTPUT FORMAT:
```

SECTION 2 - LISTING OF DATA AND BASIC STATISTICS

SAMPLE NUMBER	DRILL-HOLE NUMBER	COORDINATES X	Y	Z	BLOCK INDICES I	J	K	VARIABLE VALUES TPFE
1	1	0.0000	350.0000	0.0000	1	8	1	35.0000
2	2	50.0000	350.0000	0.0000	2	8	1	35.0000
3	3	100.0000	350.0000	0.0000	3	8	1	33.0000
4	4	150.0000	350.0000	0.0000	4	8	1	33.0000
5	5	200.0000	350.0000	0.0000	5	8	1	34.0000
6	6	250.0000	350.0000	0.0000	6	8	1	31.0000
7	7	300.0000	350.0000	0.0000	7	8	1	35.0000
8	8	350.0000	350.0000	0.0000	8	8	1	37.0000
9	9	400.0000	350.0000	0.0000	9	8	1	41.0000
10	10	450.0000	350.0000	0.0000	10	8	1	41.0000
11	11	0.0000	300.0000	0.0000	1	7	1	35.0000
12	12	50.0000	300.0000	0.0000	2	7	1	35.0000
13	13	100.0000	300.0000	0.0000	3	7	1	35.0000
14	14	250.0000	300.0000	0.0000	6	7	1	35.0000
15	15	300.0000	300.0000	0.0000	7	7	1	33.0000
16	16	450.0000	300.0000	0.0000	10	7	1	41.0000
17	17	0.0000	250.0000	0.0000	1	6	1	37.0000
18	18	50.0000	250.0000	0.0000	2	6	1	35.0000
19	19	100.0000	250.0000	0.0000	3	6	1	37.0000
20	20	150.0000	250.0000	0.0000	4	6	1	35.0000
21	21	250.0000	250.0000	0.0000	6	6	1	37.0000
22	22	300.0000	250.0000	0.0000	7	6	1	37.0000
23	23	350.0000	250.0000	0.0000	8	6	1	39.0000
24	24	400.0000	250.0000	0.0000	9	6	1	39.0000
25	25	450.0000	250.0000	0.0000	10	6	1	41.0000
26	26	0.0000	200.0000	0.0000	1	5	1	37.0000
27	27	50.0000	200.0000	0.0000	2	5	1	40.0000
28	28	100.0000	200.0000	0.0000	3	5	1	42.0000
29	29	200.0000	200.0000	0.0000	5	5	1	34.0000
30	30	250.0000	200.0000	0.0000	6	5	1	36.0000
31	31	300.0000	200.0000	0.0000	7	5	1	41.0000
32	32	450.0000	200.0000	0.0000	10	5	1	34.0000
33	33	0.0000	150.0000	0.0000	1	4	1	37.0000
34	34	100.0000	150.0000	0.0000	3	4	1	41.0000
35	35	250.0000	150.0000	0.0000	6	4	1	33.0000
36	36	150.0000	100.0000	0.0000	4	3	1	35.0000
37	37	350.0000	100.0000	0.0000	8	3	1	42.0000
38	38	400.0000	100.0000	0.0000	9	3	1	33.0000
39	39	350.0000	50.0000	0.0000	8	2	1	39.0000
40	40	450.0000	50.0000	0.0000	10	2	1	31.0000
41	41	250.0000	0.0000	0.0000	6	1	1	30.0000

NUMBER OF SAMPLES:	41
MEAN:	36.3659
VARIANCE:	10.48780
THE SMALLEST VALUE AVAILABLE FOR K9 IS:	6

SECTION 3 - PROPORTIONAL EFFECT STUDY

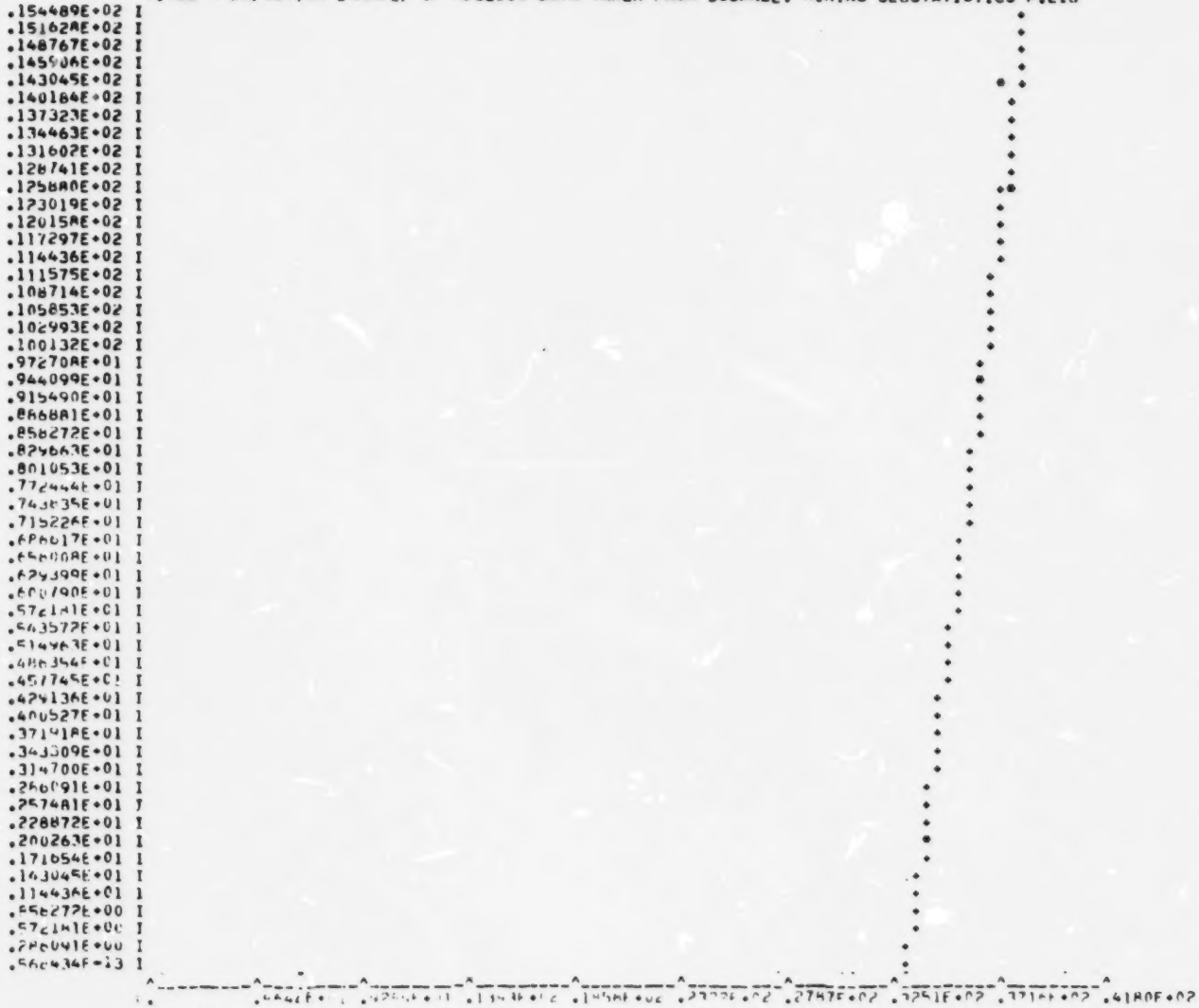
INDICES OF REFERENCE BLOCK:	1	1	1
COORDINATES OF REFERENCE POINT:	-1.000	-1.000	0.000
NUMBER OF ZONES ALONG EACH RESPECTIVE AXIS:	2	2	1
TOTAL NUMBER OF INITIAL ZONES:	4		

TABLE OF DISTINCT ZONE STATISTICS

POINTS IN ZONE	INDICES:	I	J	K	LOCAL MEAN	LOCAL VARIANCE
15		1	1	1	36.40000	9.40000
10		2	1	1	37.60000	14.04444
10		1	2	1	34.10000	1.87778
6		2	2	1	38.00000	12.40000

TOTAL NUMBER OF ZONES STUDIED:	4
TOTAL NUMBER OF POINTS:	41

NAME OF VARIABLE = TEST / PARABOLIC REGRESSION BETWEEN VARIANCES AND LOCAL MEANS /
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216



COEFFICIENT OF TOTAL CORRELATION: R= .973685461

AVERAGE VALUE OF A0: A0= -46.11514

AVERAGE VALUE OF AA: AA= .04156

NUMBER OF EVALUATIONS USED: 1

SECTION 4 - COMPUTED VARIOGRAM TABLES

PRINTED VALUES FOR EACH BLOCK ARE:

1 - SEMI-VARIOGRAM
2 - DRIFT
3 - RELATIVE VARIOGRAM
4 - AVERAGE DISTANCE BETWEEN SAMPLES
5 - NUMBER OF SAMPLES USED IN BLOCK EVALUATION

	0.000	1.000	2.000	3.000	
3					3
	10.900	11.850	8.250	15.438	
	-1.133	-2.300	-2.300	-2.125	
	1.281	1.420	1.076	1.829	
	150.00	158.11	180.28	212.13	
	15	16	10	8	
2					2
	8.222	3.941	11.250	9.038	
	-1.778	-1.176	.071	-.077	
	.946	.506	1.181	.978	
	100.00	111.80	141.42	180.28	
	18	17	14	13	
1					1
	4.250	6.472	8.559	8.321	
	-.591	-.500	.529	.214	
	.462	.759	1.106	.764	
	50.00	70.71	111.80	158.11	
	22	18	17	14	
0					0
	0.000	4.104	8.400	12.083	
	0.000	.375	1.000	.167	
	0.000	.466	1.098	1.441	
	0.00	50.00	100.00	150.00	
	0	24	20	18	
-1					-1
	4.250	5.024	11.833	9.143	
	-.591	.684	1.133	.857	
	.462	.579	1.294	1.140	
	50.00	70.71	111.80	158.11	
	22	19	15	14	
-2					-2
	8.222	9.607	11.906	9.731	
	-1.778	2.643	1.688	2.077	
	.946	1.196	1.356	1.200	
	100.00	111.80	141.42	180.28	
	18	14	16	13	
-3					-3
	10.900	15.138	10.150	17.250	
	-1.133	1.727	2.500	-1.500	
	1.281	1.756	1.246	2.141	
	150.00	158.11	180.28	212.13	
	15	11	10	10	

0.000	1.000	2.000	3.000	

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - SEMI-VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE SEMI-VARIOGRAM VALUE:

0.000	50.000	100.000	150.000
0.00	4.10	8.40	12.08
0	24	20	18

NAME OF VARIABLE = TEST / SEMI-VARIOGRAM / PHI1 = 0.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - DRIFT VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE DRIFT VALUE:

0.000	50.000	100.000	150.000
0.00	.38	1.00	.17
0	24	20	18

NAME OF VARIABLE = TEST / DRIFT / PHI1 = 0.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

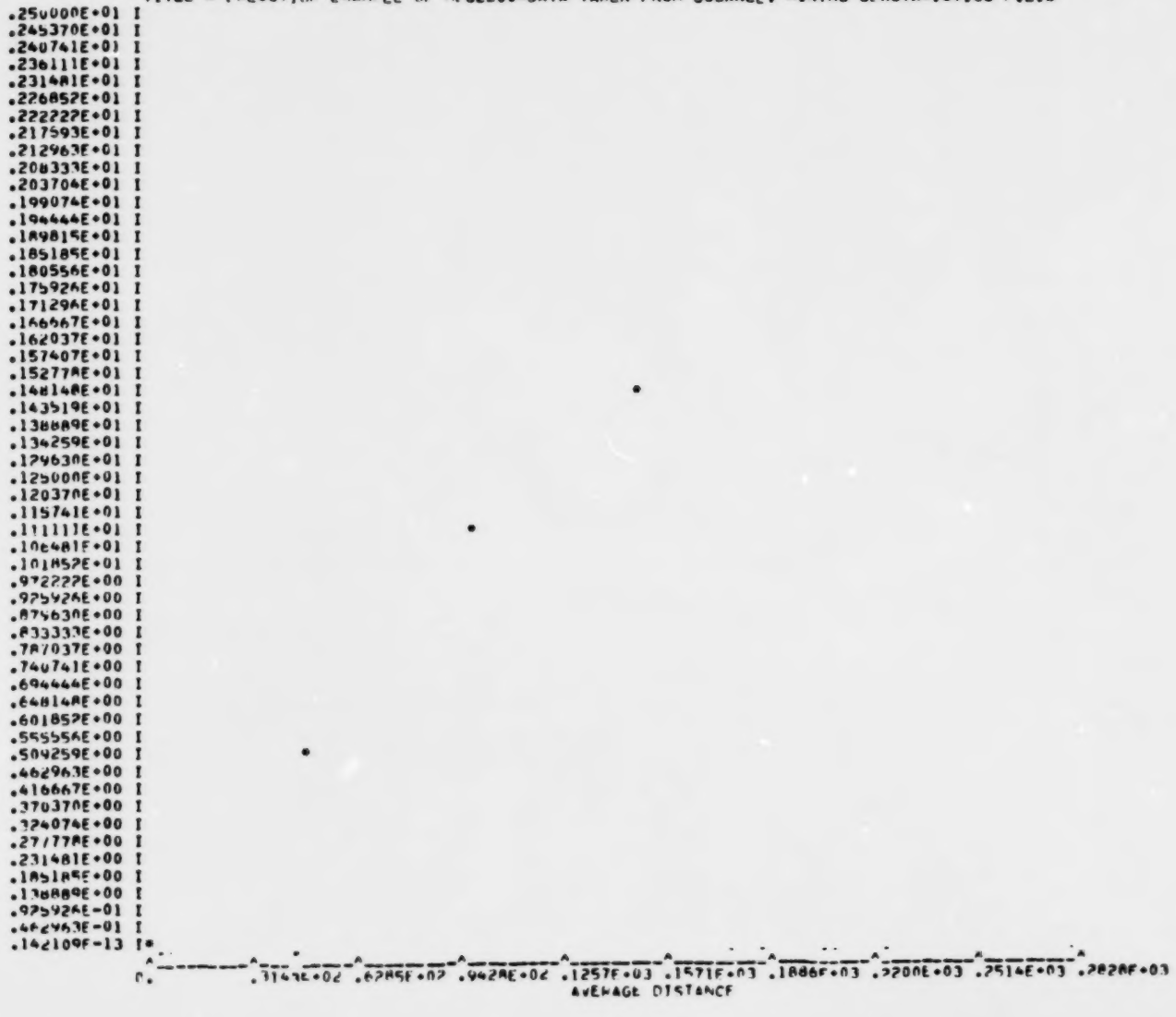
PI - AVERAGE DISTANCE OF PAIRS:

VARIO - RELATIVE VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE RELATIVE VARIOGRAM VALUE:

0.000	50.000	100.000	150.000
0.00	.47	1.10	1.44
0	24	20	18

NAME OF VARIABLE = TEST / RELATIVE VARIOGRAM / PHI1 = 0.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MFG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216



SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

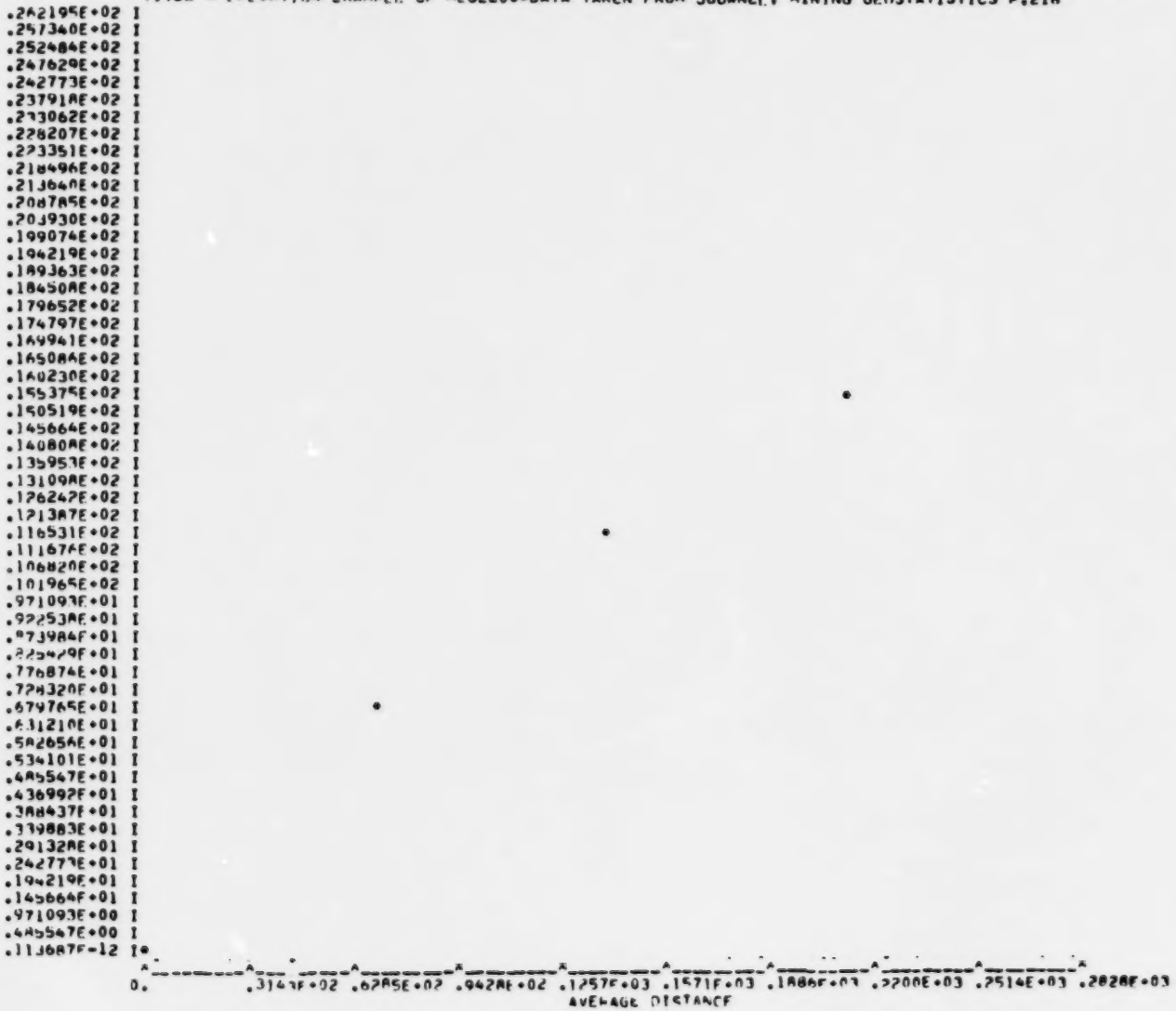
PI - AVERAGE DISTANCE OF PAIRS:

VARIO - SEMI-VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE SEMI-VARIOGRAM VALUE:

0.000	70.711	141.421	212.132
0.00	6.47	11.25	15.44
0	18	14	8

NAME OF VARIABLE = TEST / SEMI-VARIOGRAM / PHI1 = 45.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216



SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - DRIFT VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE DRIFT VALUE:

0.000	70.711	141.421	212.132
0.00	-.50	.07	-2.13
0	18	14	8

NAME OF VARIABLE = TEST / DRIFT / PHI1 = 45.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

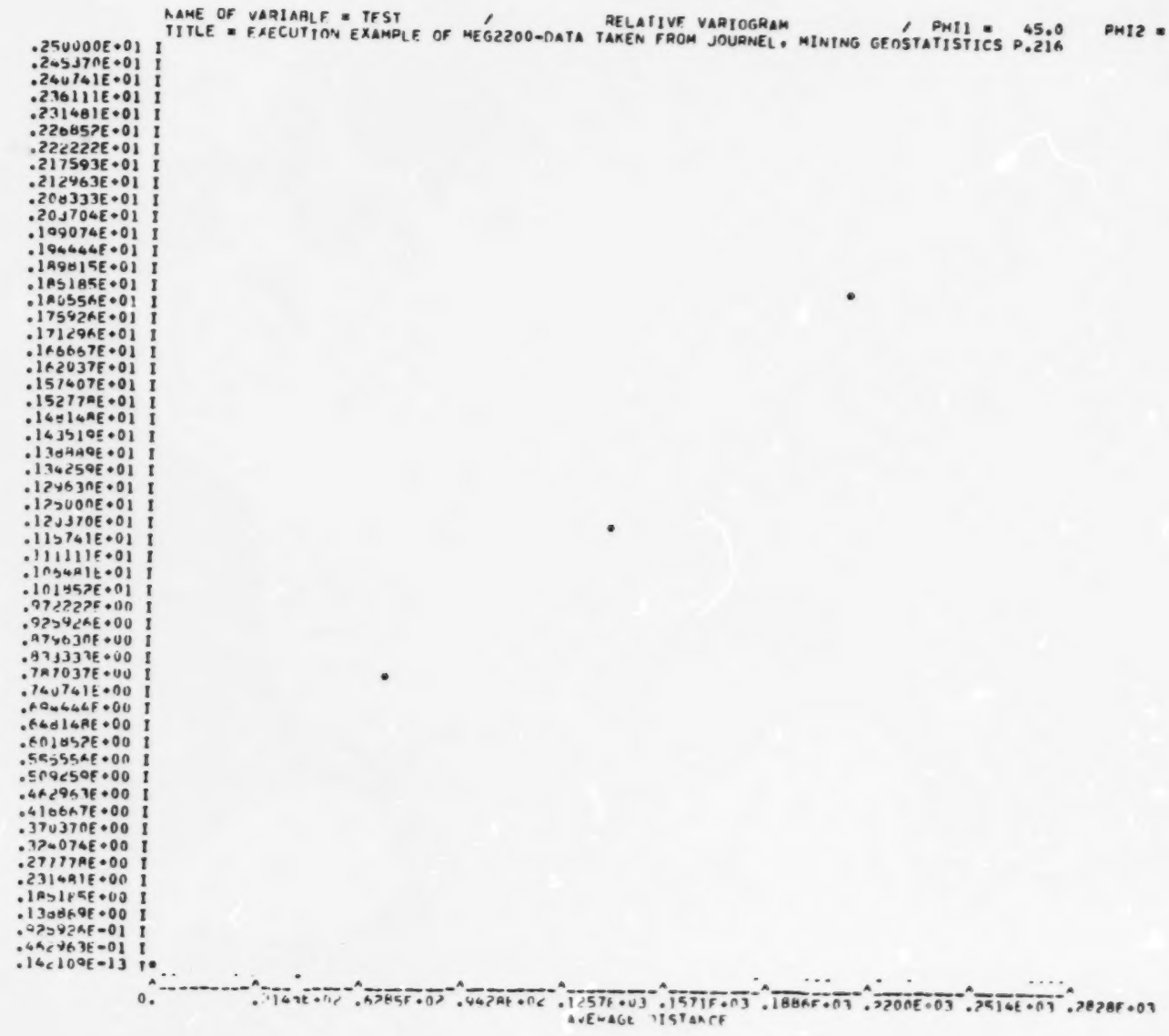
DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - RELATIVE VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE RELATIVE VARIOGRAM VALUE:

0.000	70.711	141.421	212.132
0.00	.76	1.18	1.83
8	18	14	8


NAME OF VARIABLE = TEST / RELATIVE VARIOGRAM / PHI1 = 45.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
.250000E+01
.245370E+01
.240741E+01
.236111E+01
.231481E+01
.226852E+01
.222222E+01
.217593E+01
.212963E+01
.208333E+01
.203704E+01
.199074E+01
.194444E+01
.189815E+01
.185185E+01
.180556E+01
.175926E+01
.171296E+01
.166667E+01
.162037E+01
.157407E+01
.152778E+01
.148148E+01
.143519E+01
.138889E+01
.134259E+01
.129630E+01
.125000E+01
.120370E+01
.115741E+01
.111111E+01
.106481E+01
.101852E+01
.972222E+00
.925926E+00
.879630E+00
.833333E+00
.787037E+00
.740741E+00
.694444E+00
.648148E+00
.601852E+00
.555556E+00
.509259E+00
.462963E+00
.416667E+00
.370370E+00
.324074E+00
.277778E+00
.231481E+00
.185185E+00
.138889E+00
.925926E-01
.462963E-01
.142109E-13
0.
.143E+02
.285E+02
.428E+02
.571E+03
.714E+03
.857E+03
.100E+03
.114E+03
.128E+03
AVERAGE DISTANCE

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - SEMI-VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE SEMI-VARIOGRAM VALUE:

0.000	50.000	100.000	150.000
0.00	4.25	8.22	10.90
0	22	18	15

NAME OF VARIABLE = TEST / SEMI-VARIOGRAM / PHI1 = 90.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS;

VARIO - DRIFT VALUE OF GRAPH;

NN - NUMBER OF PAIRS USED TO CALCULATE THE DRIFT VALUE;

0.000	50.000	100.000	150.000
0.00	-.59	-1.78	-1.13
0	22	18	15

NAME OF VARIABLE = TEST / DRIFT / PHI1 = 90.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MFG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

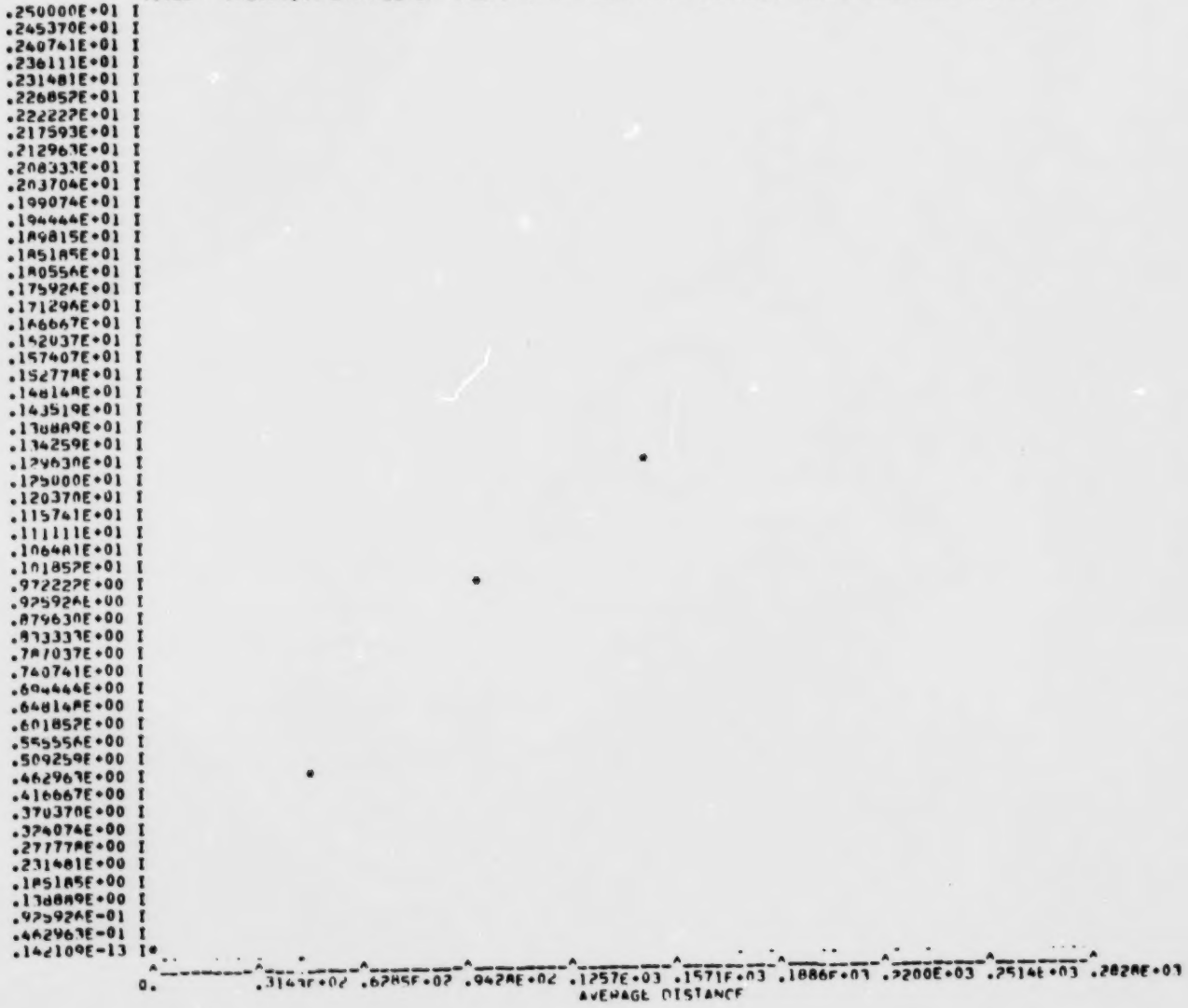
PI - AVERAGE DISTANCE OF PAIRS:

VARIO - RELATIVE VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE RELATIVE VARIOGRAM VALUE:

0.000	50.000	100.000	150.000
0.00	.44	.95	1.28
0	22	18	15

NAME OF VARIABLE = TEST / RELATIVE VARIOGRAM / PHI1 = 90.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216



SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - SEMI-VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE SEMI-VARIOGRAM VALUE:

0.000	70.711	141.421	212.132
0.00	5.03	11.91	17.25
0	19	16	10

NAME OF VARIABLE = TEST / SEMI-VARIOGRAM / PHI1 = 135.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MFG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
.282195E+02
.257340E+02
.252484E+02
.247629E+02
.242773E+02
.237918E+02
.233062E+02
.228207E+02
.223351E+02
.218496E+02
.213640E+02
.208785E+02
.203930E+02
.199074E+02
.194219E+02
.189363E+02
.184508E+02
.179652E+02
.174797E+02
.169941E+02
.165086E+02
.160230E+02
.155375E+02
.150519E+02
.145664E+02
.140808E+02
.135953E+02
.131098E+02
.126242E+02
.121387E+02
.116531E+02
.111676E+02
.106820E+02
.101965E+02
.971097E+01
.922543E+01
.873989E+01
.825429E+01
.776874E+01
.728320E+01
.679765E+01
.631210E+01
.582656E+01
.534101E+01
.485547E+01
.436992E+01
.388437E+01
.339883E+01
.291328E+01
.242773E+01
.194219E+01
.145664E+01
.971093E+00
.485547E+00
.113687E-12
0.
.314E+02
.628E+02
.942E+02
.1257E+03
.1571E+03
.1886E+03
.2200E+03
.2514E+03
.2828E+03
AVERAGE DISTANCE

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - DRIFT VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE DRIFT VALUE:

0.000	70.711	141.421	212.132
0.00	.68	1.69	-1.50
0	19	16	10

NAME OF VARIABLE = TEST / DRIFT / PHI1 = 135.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216

SECTION 5 - EXPERIMENTAL VARIOGRAMS

DESCRIPTION OF THE VARIABLES

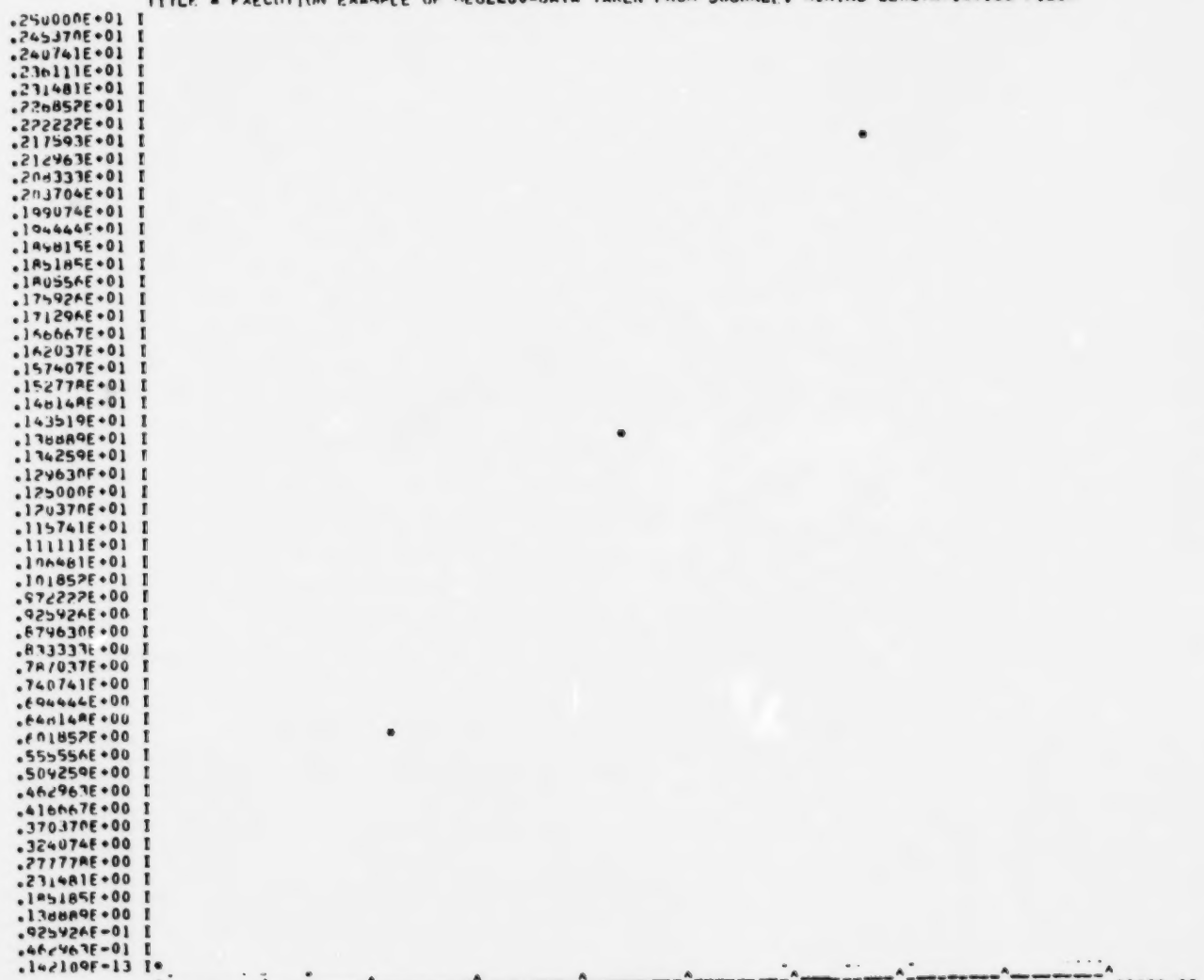
PI - AVERAGE DISTANCE OF PAIRS:

VARIO - RELATIVE VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE RELATIVE VARIOGRAM VALUE:

0.000	70.711	141.421	212.132
0.00	.58	1.36	2.14
0	19	16	10

NAME OF VARIABLE = TEST / RELATIVE VARIOGRAM / PHI1 = 135.0 PHI2 = 0.0
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216



SECTION 6 - EXPERIMENTAL VARIOGRAMS (AVERAGE)

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS;

VARIO - AVERAGE SEMI-VARIOGRAM VALUE OF GRAPH;

NN - NUMBER OF PAIRS USED TO CALCULATE THE AVERAGE SEMI-VARIOGRAM VALUE;

50.000	97.536	189.702	212.132
4.17	7.61	10.67	16.44
44	138	158	18

NAME OF VARIABLE = TEST / AVERAGE SEMI-VARIOGRAM /
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
.262195E+02
.257340E+02
.252484E+02
.247629E+02
.242773E+02
.237918E+02
.233062E+02
.228207E+02
.223351E+02
.218496E+02
.213640E+02
.208785E+02
.203930E+02
.199074E+02
.194219E+02
.189363E+02
.184508E+02
.179652E+02
.174797E+02
.169941E+02
.165086E+02
.160230E+02
.155375E+02
.150519E+02
.145664E+02
.140808E+02
.135953E+02
.131098E+02
.126242E+02
.121387E+02
.116531E+02
.111676E+02
.106820E+02
.101965E+02
.971093E+01
.922539E+01
.873984E+01
.825429E+01
.776874E+01
.728320E+01
.679765E+01
.631210E+01
.582656E+01
.534101E+01
.485547E+01
.436992E+01
.388437E+01
.339883E+01
.291328E+01
.242773E+01
.194219E+01
.145664E+01
.971093E+00
.485547E+00
.113687E-12
0.
.3142E+02
.6285E+02
.9428E+02
.1257E+03
.1571E+03
.1885E+03
.2200E+03
.2514E+03
.2828E+03
AVERAGE DISTANCE

SECTION A - EXPERIMENTAL VARIOGRAMS (AVERAGE)

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - AVERAGE DRIFT VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE AVERAGE DRIFT VALUE:

50.000	97.536	159.702	212.132
-.09	.25	.74	-1.78
44	138	158	18

NAME OF VARIABLE = TEST / AVERAGE DRIFT /
TITLE = EXECUTION EXAMPLE OF MEG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
.512050E+01
.493085E+01
.474120E+01
.455155E+01
.436191E+01
.417226E+01
.398261E+01
.379296E+01
.360331E+01
.341367E+01
.322402E+01
.303437E+01
.284472E+01
.265507E+01
.246543E+01
.227578E+01
.208613E+01
.189648E+01
.170683E+01
.151718E+01
.132754E+01
.113789E+01
.948241E+00
.758592E+00
.568944E+00
.379296E+00
.189648E+00
.284217E-13
-.189648E+00
-.379296E+00
-.568944E+00
-.758592E+00
-.948241E+00
-.113789E+01
-.132754E+01
-.151718E+01
-.170683E+01
-.189648E+01
-.208613E+01
-.227578E+01
-.246543E+01
-.265507E+01
-.284472E+01
-.303437E+01
-.322402E+01
-.341367E+01
-.360331E+01
-.379296E+01
-.398261E+01
-.417226E+01
-.436191E+01
-.455155E+01
-.474120E+01
-.493085E+01
-.512050E+01
0.
.3147E+02
.6294E+02
.9442E+02
.1257E+03
.1571E+03
.1886E+03
.2200E+03
.2514E+03
.2828E+03
AVERAGE DISTANCE

SECTION A - EXPERIMENTAL VARIOGRAMS (AVERAGE)

DESCRIPTION OF THE VARIABLES

PI - AVERAGE DISTANCE OF PAIRS:

VARIO - AVERAGE RELATIVE VARIOGRAM VALUE OF GRAPH:

NN - NUMBER OF PAIRS USED TO CALCULATE THE AVERAGE RELATIVE VARIOGRAM VALUE:

50.000	97.536	159.702	212.132
.46	.92	1.23	2.00
46	138	158	18

NAME OF VARIABLE = TEST / AVERAGE RELATIVE VARIOGRAM /
TITLE = EXECUTION EXAMPLE OF MFG2200-DATA TAKEN FROM JOURNEL, MINING GEOSTATISTICS P.216
.250000E+01
.245370E+01
.240741E+01
.236111E+01
.231481E+01
.226852E+01
.222222E+01
.217593E+01
.212963E+01
.208333E+01
.203704E+01
.199074E+01
.194444E+01
.189815E+01
.185185E+01
.180556E+01
.175926E+01
.171296E+01
.166667E+01
.162037E+01
.157407E+01
.152778E+01
.148148E+01
.143519E+01
.138889E+01
.134259E+01
.129630E+01
.125000E+01
.120370E+01
.115741E+01
.111111E+01
.106481E+01
.101852E+01
.972222E+00
.925926E+00
.879630E+00
.833333E+00
.787037E+00
.740741E+00
.694444E+00
.648148E+00
.601852E+00
.555556E+00
.509259E+00
.462963E+00
.416667E+00
.370370E+00
.324074E+00
.277778E+00
.231481E+00
.185185E+00
.138889E+00
.925926E-01
.462963E-01
.142109E-13
0.
.3143E+02
.6285E+02
.9428E+02
.1257E+03
.1571E+03
.1886E+03
.2200E+03
.2514E+03
.2828E+03
AVERAGE DISTANCE

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APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

ERP – MRL
82–110 TR

Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2275 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin
Mine Evaluation Group

October 1982

This document is an unedited interim report prepared [illegible] for discussion and internal reporting purposes. It does not represent a final expression [illegible] the opinion of the Canada [illegible] for Mineral and Energy [illegible] (CANMET)

Ce document est un rapport [illegible] révisé et rédigé [illegible] fin de [illegible] documentation [illegible] nulle- [illegible] de [illegible] canadien de [illegible] des minéraux et de l'énergie (CANMET)

26pp

ENERGY RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT ERP/MRL 82-110(TR)

PROGRAM MEG2275 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2275 is to find the best variogram model which will fit the experimental variogram values. Up to nine different theoretical models can be examined and the user can deal with a double structured model. The program will select automatically the best fitting model and provide all the necessary parameters. The nugget-effect parameter can also be predetermined.

The input file of MEG2275 is provided by MEG2200, MEG2250 or by the user.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

*Mining Geologist and Geostatistician, Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa.

GUIDE D'USAGER POUR LE PROGRAMME MEG2275
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2275 est de définir le meilleur modèle théorique s'ajustant aux valeurs du variogramme expérimental. Neuf modèles théoriques différents peuvent être examinés et l'utilisateur peut ajuster un modèle reflétant une double structure. Le programme choisira automatiquement le meilleur modèle et en fournira tous les paramètres. L'effet de pépite peut être prédéterminé. Le fichier d'entrée de MEG2275 est fourni par MEG2200, MEG2250 ou par l'utilisateur.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2275(X,X2,Y,Y2,AD,AAD,BD,AD2,BD2,SSED,NOBS,K1,K2,
     -                   K3,COD,XNST,YNST,X3)
C*
C*
C*****************************************************************************
C*                                                                            *
C*                                                                            *
C*******GENERAL DESCRIPTION                                                   *
C*                                                                            *
C*     THIS PROGRAM SEARCHES FOR THE VARIOGRAM MODEL WHICH HAS THE            *
C*     BEST FIT WITH EXPERIMENTAL VARIOGRAM READ ON INPUT FILE.               *
C*     THE PROGRAM ANALYZES SUCH MODELS AS:    LINEAR MODEL                   *
C*                                             EXPONENTIAL MODEL              *
C*                                             SPHERICAL MODEL                *
C*                                             HOLE EFFECT(COSINE)            *
C*                                             HOLE EFFECT(SINE)              *
C*                                             LOGARITHMIC MODEL.             *
C*                                               MODIFIED GEOMETRIC           *
C*                                                MODEL                       *
C*                                             GAUSS MODEL                    *
C*                                             COMBINED COSINE-               *
C*                                               EXPONENTIAL MODEL            *
C*     THE PROGRAM USES VARIOGRAM VALUES CALCULATED BY MEG2200 AND            *
C*     MEG2250 THAT ARE STORED ON TAPE 3.  DATA MAY ALSO BE SPECIFIED         *
C*     ON INPUT CARDS AFTER OPTION CARD 5. THIS PROGRAM USES VARIABLE         *
C*     DIMENSIONS. MEG2275 WAS WRITTEN USING CDC FORTRAN LEVEL 4.8 AND        *
C*     WAS ORIGINALLY WRITTEN BY RAYMOND SABOURIN, FRANCOIS ANGER AND         *
C*     ROGER GUILLEMETTE (EMR,CANMET,MRL).MAY,1982.                           *
C*                                                                            *
C*****************************************************************************
C*
C*
C*****************************************************************************
C*                                                                            *
C*                                                                            *
C*******SPECIFICATIONS                                                        *
C*                                                                            *
C*     IN ORDER TO SKIP ANY DESIRED NUMBER OF VARIOGRAMS FROM                 *
C*     TAPE(IN), THE USER NEED SIMPLY INDICATE ON OPTION CARD 2               *
C*     THAT NN.GT.N1.  THE PROGRAM WILL THUS SKIP OVER N1+N2 POINTS           *
C*     AND WILL THEN READ A NEW CARD 2.                                       *
C*     THE LINEAR MODEL IS NOT OPTIONAL AS IT IS REQUIRED FOR MOST            *
C*     OF THE OTHER MODELS.  IN PARTICULAR, THE LINEAR MODEL DEFINES          *
C*     THE Y-INTERCEPT (NUGGET-EFFECT) USED IN THE EXPONENTIA,SPHERICAL*
C*     AND COMBINED MODELS UNLESS AN INTERCEPT IS SPECIFIED BY USER ON        *
C*     INPUT.                                                                 *
C*     EACH MODEL IS CHOSEN BY THE USE OF THE DIGIT '1'.  UNDESIRED           *
C*     MODELS ARE THUS INDICATED BY ZERO (SEE OPTION CARD 3).                 *
C*     IF THE MODEL CHOSEN RESULTS FROM AN APPLICATION OF THE DOUBLE          *
C*     STRUCTURE OPTION, THE PROGRAM WILL DISPLAY AN ADDITIONNAL GRAPH        *
C*     CONTAINING THE DOUBLE STRUCTURE OF THAT MODEL.  HOWEVER, IF            *
C*     THIS REPRESENTATION IS UNDESIRED, THE USER MUST APPLY THE GIVEN        *
C*     OPTION WITH THE DIGIT '2'.                                             *
C*                                                                            *
C*****************************************************************************
C*
C*
```

```
C*****************************************************************************
C*                                                                           *
C******OPTIONS READ ON INPUT                                                 *
C*                                                                           *
C*      CARD 1 - IN, NOPOND, FMT                                             *
C*               FORMAT READ IS (2I5,7A10);                                  *
C*           IN      - UNIT NUMBER OF FILE CONTAINING DATA;                  *
C*                     DEFAULT IS TAPE 3 (PFNI);                             *
C*                     USE TAPE 1 WHEN DATA ARE TO BE SPECIFIED ON INPUT;    *
C*           NOPOND  - OPTION WHICH PERMITS USE OF EQUAL FREQUENCIES         *
C*                     (NUMBER OF PAIRS) FOR ALL POINTS;                     *
C*                     IF NOPOND=0, FREQUENCIES ARE READ WITH DATA;          *
C*                     IF NOPOND=1, ALL FREQUENCIES ARE GIVEN EQUAL          *
C*                     VALUES AND ONLY COORDINATES ARE READ;                 *
C*           FMT     - FORMAT FOR READING DATA;                              *
C*                                                                           *
C*                     AVAILABLE READING STATEMENTS ARE;                     *
C*                     IF NOPOND=0,                                          *
C*                     READ(IN,FMT) X(I),Y(I),NOBS(I)                        *
C*                     DEFAULT VALUE FMT=(2E15.5,30X,I10)                    *
C*                     IF NOPOND=1,                                          *
C*                     READ(IN,FMT) X(I),Y(I)                                *
C*                     DEFAULT VALUE FMT=(2E15.5)                            *
C*                                                                           *
C*      FOR EACH SET OF DATA STUDIED, THE FOLLOWING FIVE CARDS ARE TO        *
C*      BE REPEATED;                                                         *
C*      TO SKIP A SET OF N1+N2 SAMPLES, SET NN GREATER THAN N1 AND USE       *
C*      ONLY CARD 2;                                                         *
C*                                                                           *
C*      CARD 2 - N1, N2, NN, IMPR, MAX                                       *
C*               FORMAT READ IS (5I5);                                       *
C*           N1      - NUMBER OF POINTS IN VARIOGRAM TO BE USED FOR          *
C*                     STEPWISE ANALYSIS;                                    *
C*                     ONLY THE FIRST N1 POINTS OF VARIOGRAM WILL BE         *
C*                     USED;                                                 *
C*           N2      - NUMBER OF INSIGNIFICANT POINTS WITHIN GIVEN           *
C*                     VARIOGRAM;                                            *
C*                     THE TOTAL NUMBER OF POINTS IN A VARIOGRAM IS THUS     *
C*                     GIVEN BY N1 + N2;                                     *
C*           NN      - NUMBER OF POINTS TO BE USED IN FITTING THE LINEAR     *
C*                     AND LOGARITHMIC MODELS;                               *
C*                     NN.GE.3 AND NN.LE.N1;                                 *
C*                     THE FIRST NN POINTS WILL BE USED;                     *
C*                     IF NN.GT.N1, VARIOGRAM IS SKIPPED - I.E., N1+N2       *
C*                     SAMPLES ARE READ AND THEN A NEW CARD 2 IS READ FOR    *
C*                     THE NEXT VARIOGRAM;                                   *
C*           IMPR    - IF IMPR=0, ONLY THE OPTIMAL CHOICE FOR EACH MODEL     *
C*                     IS PRINTED;                                           *
C*                     IF IMPR=1, A TABLE OF SIMULATION VALUES IS PRINTED    *
C*                     FOR EACH ITERATION;                                   *
C*           MAX     - GREATEST NUMBER OF ITERATIONS FOR EXPONENTIAL,        *
C*                     SPHERICAL, HOLE EFFECT, MODIFIED GEOMETRIC,           *
C*                     GAUSS, AND COMBINED MODELS,                           *
C*                     THIS VALUE, AS WELL AS ESPI (CARD 5), WILL BE USED    *
C*                     TO LIMIT EXECUTION TIME FOR EACH MODEL;               *
C*                     DEFAULT VALUE IS MAX=10;                              *
C*                                                                           *
```

```
      C*     CARD 3 - IE, IS, IT, ISIN, ILOG, IEXP, IGAUS, ICOEX, IC, NST.
      C*              FORMAT READ IS (2011)
      C*     IE     - IF IE = 1, THE PROGRAM ANALYZES THE EXPONENTIAL MODEL.
      C*              IF IE IS EQUAL TO ZERO, IT SKIPS THIS MODEL.
      C*     IS     - IF IS = 1, THE PROGRAM ANALYZES THE SPHERICAL MODEL.
      C*              IF IS IS EQUAL TO ZERO, IT SKIPS THIS MODEL.
      C*     IT     - IF IT = 1, THE PROGRAM ANALYZES THE HOLE EFFECT MODEL
      C*              (COSINE).
      C*              IF IT IS EQUAL TO ZERO, IT SKIPS THIS MODEL.
      C*     ISIN   - IF ISIN = 1, THE PROGRAM ANALYZES THE HOLE EFFECT MODEL
      C*              (SINE).
      C*              IF ISIN IS EQUAL TO ZERO, IT SKIPS THIS MODEL.
      C*     ILOG    - IF ILOG.EQ.1, THE LOGARITHMIC MODEL IS ANALYZED;
      C*              OTHERWISE ILOG MUST EQUAL ZERO;
      C*     IEXP    - IF IEXP.EQ.1, THE   MODIFIED GEOMETRIC MODEL IS
      C*              TESTED, OTHERWISE IEXP MUST EQUAL ZERO.
      C*     IGAUS   - IF IGAUS.EQ.1 THE GAUSSIAN MODEL IS ANALYZED;
      C*              OTHERWISE IGAUS MUST EQUAL ZERO.
      C*     ICOEX   - IF ICOEX.EQ.1 THE COMBINED EXPONENTIAL/COSINE MODEL
      C*              IS ANALYZED, OTHERWISE ICOEX MUST EQUAL ZERO.
      C*     IC      - OPTION WHICH PERMITS USER TO SPECIFY THE NUGGET EFFECT
      C*              (Y-INTERCEPT) OF SIMULATED GRAPHS (SEE OPTION CCC OF
      C*              CARD 4);
      C*              IF IC.EQ.1 OPTION IS USED;
      C*              IF IC.EQ.0 OPTION IS VOID;
      C*     NST    - MODEL NUMBER FOR THE BASIC VARIOGRAM IF THE EXPERIMENTAL
      C*              VARIOGRAM HAS A DOUBLE STRUCTURE.
      C*              NST = 0, IF IT HASN'T TWO STRUCTURES
      C*               AVAILABLE VALUES FOR NST ARE AS FOLLOWS;
      C*                   1 - LINEAR MODEL
      C*                       Y=CO+C*X
      C*                   2 - EXPONENTIAL MODEL
      C*                       Y=CO+C*(1-EXP(-X/A))
      C*                   3 - SPHERICAL MODEL
      C*                       Y=CO+C*(1.5*X/A-0.5*(X/A)**3) IF X.LE.A
      C*                       Y=CO+C IF X.GT.A
      C*                   4 - COSINE MODEL (HOLE EFFECT)
      C*                       Y=CO+C*(1-COS(X/A))
      C*                   5 - SINE MODEL (HOLE EFFECT)
      C*                       Y=CO+C*(1-SIN(X/A)/(X/A))
      C*                   6 - LOGARITHMIC MODEL
      C*                       Y=CO+C*ALOG(X)
      C*                   7 - MODIFIED GEOMETRIC MODEL
      C*                       Y=CO+C*X**A
      C*                   8 - GAUSS MODEL
      C*                       Y=CO+C*(1-EXP(-(X/A)**2))
      C*                   9 - COMBINED COSINE/EXPONENTIAL MODEL
      C*                       Y=CO+C*(1-EXP(-X/A)*COS(BIN*X))
      C*
      C*     CARD 4 - USE OF THIS CARD IS DETERMINED BY OPTIONS IC AND NST;
      C*              CARD 4 IS NOT USED WHEN BOTH IC AND NST EQUAL ZERO;
      C*              CO, C, A, BIN, CCC;
      C*              FORMAT READ IS (5E16.5)
      C*     CO     - NUGGET EFFECT OF THE FIRST STRUCTURE
      C*     C      - SILL VALUE OF THE FIRST STRUCTURE
      C*     A      - RANGE OF THE FIRST STRUCTURE
      C*     BIN     - COSINE COEFFICIENT OF FIRST STRUCTURE, USED WHEN
```

```
C*                NST.EQ.9;                                              *
C*      CCC   - REDEFINED NUGGET EFFECT (Y-INTERCEPT) TO BE USED ON      *
C*                MODELS WHEN IC=1;                                      *
C*                                                                       *
C*      CARD 5 - VAR,ESPI                                                *
C*                FORMAT READ IS (F10.3,F10.6)                           *
C*      VAR   - EXPERIMENTAL VARIANCE                                    *
C*      ESPI  - MAXIMAL DIFFERENCE OF STANDARD ERRORS BETWEEN TWO        *
C*                SUCCESSIVE ITERATIONS;                                 *
C*                     DEFAULT VALUE IS 0.001;                           *
C*                                                                       *
C*      DATA CARDS - IF IN=1, N1 + N2 CARDS CONTAINING DATA ARE READ     *
C*                     HERE FOR CURRENT VARIOGRAM;                       *
C*                     DATA CARDS ARE READ IN INCREASING ORDER OF        *
C*                     DISTANCES;                                        *
C*                                                                       *
C*      CARD 6 - TITRE                                                   *
C*                FORMAT READ IS (8A10)                                  *
C*      TITRE - TITLE OF THE VARIOGRAM                                   *
C*                                                                       *
C*                                                                       *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                       *
C******VARIABLE DIMENSIONS                                              *
C*                                                                       *
C*      K1 - GREATEST NUMBER OF SAMPLES PER VARIOGRAM;                   *
C*      K2 - K2=MAX0(NN,MAX);                                            *
C*      K3 - K3=K1 IF NST.GT.0, OTHERWISE K3=1;                          *
C*                                                                       *
C*                                                                       *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                       *
C******FILES USED                                                       *
C*                                                                       *
C*      TAPE1 - INPUT DATA CARDS;                                        *
C*      TAPE2 - OUTPUT DISPOSITION;                                      *
C*          SECTION -1- OPTIONS APPLIED                                  *
C*          SECTION -2- INTERPRETATION OF A MODEL                        *
C*          SECTION -3- SUMMARY OF RESULTS                               *
C*      TAPE3 - INPUT DATA FILE (PFNI), SEE RECORDING STATEMENT OF       *
C*                MEG2200 OR MEG2250 FOR OUTPUT FILE.                    *
C*                                                                       *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                       *
C******DESCRIPTION OF PARAMETERS                                        *
C*                                                                       *
C*      X       - ARRAY CONTAINING DISTANCE VALUES;                      *
C*      X2      - ARRAY CONTAINING THEORIC MODEL FOR EACH POINT;         *
```

```
C*      Y       - ARRAY CONTAINING EXPERIMENTAL VARIOGRAM VALUES;
C*      Y2      - ARRAY CONTAINING LOGARITHMIC VALUES OF EXPERIMENTAL
C*                VARIOGRAM;
C*      AD      - ESTIMATED LINEAR ORDINATES (NUGGET EFFECT);
C*      AAD     - USED TO RECORD VALUES OF THE 'A' COEFFICIENT FOR
C*                EACH STEP OF A CURVE SIMULATION;
C*      BD      - ESTIMATED LINEAR SLOPES;
C*      AD2     - ESTIMATED PARABOLIC ORDINATES;
C*      BD2     - ESTIMATED SLOPE COEFFICIENT FOR PARABOLA;
C*      SSED    - USED TO RECORD STANDARD ERRORS FOR EACH STEP;
C*      NOBS    - ARRAY CONTAINING THE NUMBER OF PAIRS AT THE POINT
C*                (X(I),Y(I));
C*      COD     - USED TO RECORD VALUES OF Y-ORDINATE FOR NUGGET EFFECT;
C*      XNST    - USED TO RECORD SUBTRACTED VALUES ASSOCIATED WITH THE
C*                FIRST OF TWO STRUCTURES;
C*      YNST    - USED TO RECORD ORIGINAL Y-VALUES IF DOUBLE STRUCTURE
C*                OPTION IS CHOSEN;
C*      X3      - USED FOR GRAPHICAL OUTPUT OF DOUBLE STRUCTURE;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******REQUIRED SUBROUTINES
C*
C*      MEG2276 - LINEAR AND PARABOLIC REGRESSION;
C*      MEG2277 - CALCULATES STANDARD ERRORS;
C*      MEG2278 - OUTPUTS A TABLE OF RESPECTIVE VALUES, FREQUENCIES,
C*                AND ERRORS;
C*      MEG2279 - INITIALIZES VALUES FOR THE 'A' PARAMETER IN MOST
C*                CURVE MODELS;
C*      MEG2280 - OUTPUT OF GRAPH;
C*      MEG22A1 - INITIALIZES THE 'A' PARAMETER FOR THE COMBINED MODEL;
C*      MEG22A2 - USED FOR PRINTING GRAPH OF DOUBLE STRUCTURE;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******COMMON BLOCKS
C*
C*      COMBIN - USED FOR COMBINED MODEL;
C*      REGRES - USED IN PARABOLIC SIMULATION;
C*      COEF   - USED TO RECORD COEFFICIENTS FOR THE FIRST OF TWO
C*                STRUCTURES;
C*
C*****************************************************************
C*
C*****************************************************************
C*
C******EXECUTION
C*
C*      H2275,CM65000,T200,I01000,P2.
C*      ACCOUNT,*****,PW=******.
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
```

```
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2275,                                  *
C*      PFNI=                    , PERMANENT FILE NAME OF INPUT DATA FILE.*
C*                                 IF INPUT DATA ARE ON CARDS, PFNI NEED  *
C*                                 NOT BE SPECIFIED. PFNI IS OUTPUT FILE  *
C*                                 OF MEG2200 OR MEG2250.                 *
C*      Q1=K1, SEE VARIABLE DIMENSIONS IN MEG2275                          *
C*      Q2=K2,                                                             *
C*      Q3=K3.                                                             *
C*                                                                         *
C*************************************************************************
C*
C*************************************************************************
C*                                                                         *
C******DECLARATIONS                                                        *
C*                                                                         *
C*************************************************************************
C*
C*
      REAL X(K1),X2(K1),Y(K1),AD(K2),BD(K2),SSED(K2),AAD(K2),AD2(K1),
     -     BD2(K1),COD(K2),Y2(K1)
      REAL XNST(K3),YNST(K3),X3(K1)
      REAL FMT(7),SE(9)
      REAL CTD(5),ATD(5),SSEDD(5)
      REAL BTD(5),X4(116)
      REAL TITRE(8)
      INTEGER INDY(5)
      INTEGER NOBS(K1)
C*
C******COMMON AREAS
C*
      COMMON/COMBIN/IND,AAA(11)
      COMMON/REGRES/SNX3,SNX4,SNYX2,PONDXY,PONYX2,PARC
      COMMON/COEF/Z1,Z2,Z3,Z4
C*
C*
C*************************************************************************
C*                                                                         *
C******MAIN-LINE PROGRAM BODY                                              *
C*                                                                         *
C*************************************************************************
C*
      NOIND=0
      ICARD=2
C*
C******READING OF OPTIONS
C*
C******CARD 1
C*
      READ(1,1000) IN,NOPOND,FMT
C*
      IF(IN.EQ.0) IN=3
      IF((FMT(1).EQ.10H          ).AND.(FMT(2).EQ.10H          ))NOIND=1
      IF((NOPOND.NE.1).OR.(NOIND.NE.1)) GO TO 5
      FMT(1)=10H(2E15.5)
C*
C******CARD 2
C*
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

MEG2275 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 2
NAME _____

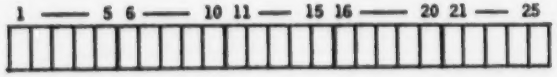
CARD NO. 1

IN NOPOND (FMT(I),I=1,7) FORMAT(2I5,7A10)

FOR EACH SET OF DATA STUDIES, THE FOLLOWING FIVE CARDS ARE REPEATED

CARD NO. 2

N1 N2 NN IMPR MAX FORMAT(5I5)



CARD NO. 3

IE IS IT ISIN ILOG IEXP IGAUS ICOEX IC NST FORMAT(20I1)

MEG2275 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 2 OF 2
NAME _____

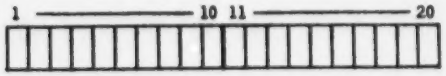
CARD NO. 4

CO C A BIN CCC

FORMAT(5E16.5)

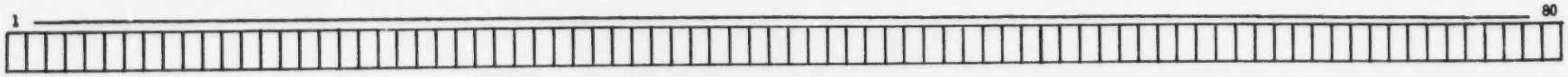
CARD NO. 5

VAR ESPI FORMAT(F10.3,F10.6)



CARD NO. 6

(TITRE(I),I=1,8) FORMAT(8A10)



EXECUTION

```
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2275,
PFNI=                    ,(PERMANENT FILE NAME OF INPUT DATA FILE CREATED BY PROGRAM MEG2200 OR MEG2250.)
Q1=     ,Q2=     ,Q3=     .
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2275 - OPTION CARDS

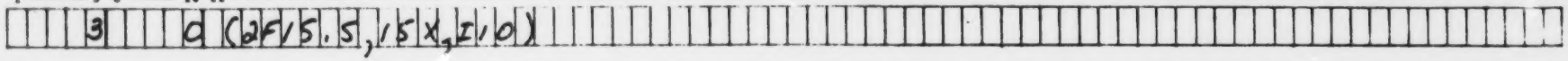
VERSION NO. 1
MAY, 1982

DATE 8-10-82
PAGE 1 OF 2
NAME RS

CARD NO. 1

IN NOPOND (FMT(I),I=1,7) FORMAT(2I5,7A10)

1 — 5	6 — 10	11 — 60
3	0	(2F15.5,15X,I10)



FOR EACH SET OF DATA STUDIES, THE FOLLOWING FIVE CARDS ARE REPEATED

CARD NO. 2

N1 N2 NN IMPR MAX FORMAT(5I5)

1 — 5	6 — 10	11 — 15	16 — 20	21 — 25
2	1	2	0	5

CARD NO. 3

IE IS IT ISIN ILOG IEXP IGAUS ICOEX IC NST FORMAT(20I1)

1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	1	0

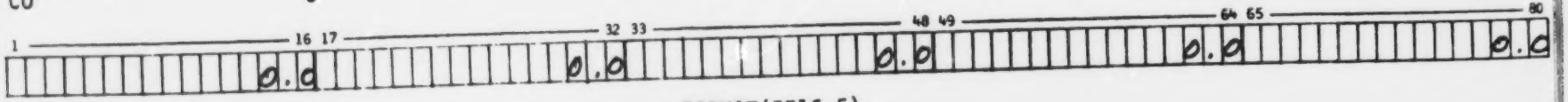
MEG2275 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 8-10-82
PAGE 2 OF 2
NAME RS

CARD NO. 4

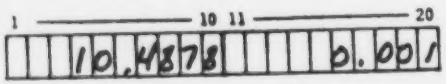
CO C A BIN CCC



FORMAT(5E16.5)

CARD NO. 5

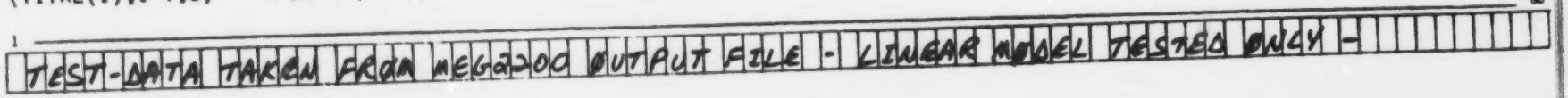
VAR ESPI FORMAT(F10.3,F10.6)



13

CARD NO. 6

(TITRE(I),I=1,8) FORMAT(8A10)



EXECUTION

ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=****,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2275,
PFNI=MEG2200DATATEST,(PERMANENT FILE NAME OF INPUT DATA FILE CREATED BY PROGRAM MEG2200 OR MEG2250.)
Q1= 3 ,Q2= 5 ,Q3= 1 .

```
PROGRAM GEM2275    73/74   OPT=1                    FTN 4.8+528        08/10/82  11.51.57       PAGE     1

      PROGRAM GEM2275(INPUT,OUTPUT,TAPE3,TAPE1=INPUT,
     -                TAPE2=OUTPUT)
      REAL X(3),X2(3), Y(3), AD(5), BD(5), SSED(5),
     -     AAD(5),AD2(3),BD2(3),COD(5),Y2(3),
     -          XNST(1),YNST(1),X3(3)
      INTEGER NOBS(3)
C*     GREATEST NUMBER OF SAMPLES PER VARIOGRAM
      K1=3
C*     K2=MAX(N1,N2)
C*     N1=NUMBER OF LINEAR SIMULATION POINTS
C*     N2=GREATEST NUMBER OF ITERATIONS PER MODEL
C*     USUALLY K2=20 (APPROXIMATELY)
      K2=5
C*     K3=K1 IF A DOUBLE STRUCTURE IS APPLIED (NST.GT.0)
C*     OTHERWISE K3=1
      K3=1
      CALL MEG2275(X,X2,Y,Y2,AD,AAD,BD,AD2,BD2,SSED,NOBS,K1,K2,K3,
     -             COD,XNST,YNST,X3)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	IN=	3	UNIT NUMBER OF FILE CONTAINING DATA;
	NOPOND=	0	OPTION WHICH CAUSES PROGRAM TO EVENLY WEIGH ALL SAMPLES (NOPOND=1);
	FMT=	(2F15.5,15X,I10)	FORMAT USED FOR READING DATA FROM TAPE 3;
2	N1=	2	NUMBER OF SIGNIFICANT POINTS TO BE CONSIDERED FOR VARIOGRAM ANALYSIS;
	N2=	1	NUMBER OF POINTS REJECTED FROM DATA;
	NN=	2	NUMBER OF POINTS USED IN LINEAR REGRESSION;
	IMPR=	0	OPTION WHICH CAUSES PROGRAM TO PRINT ALL ITERATIONS IN DETAIL (IMPR=1) INSTEAD OF PRINTING ONLY THE BEST MODEL (IMPR=0);
	MAX=	5	GREATEST NUMBER OF REPETITIONS TO BE USED IN ITERATION MODELS;
3	IE=	0	EXPONENTIAL MODEL;
	IS=	0	SPHERICAL MODEL;
	IT=	0	COSINE MODEL (HOLE EFFECT);
	ISIN=	0	SINE MODEL (HOLE EFFECT);
	ILOG=	0	LOGARITHMIC MODEL;
	IEXP=	0	MODIFIED GEOMETRIC MODEL;
	IGAUS=	0	GAUSSIAN MODEL;
	ICOEX=	0	COMBINED COSINE/EXPONENTIAL MODEL;
	IC=	1	OPTION ALLOWING USER TO SPECIFY Y-INTERCEPT FOR GRAPHS;
	NST=	0	MODEL NUMBER OF FIRST STRUCTURE (IF UNEQUAL TO ZERO);
4	CO=	0.000000	Y-INTERCEPT OF FIRST STRUCTURE;
	C=	0.000000	SILL VALUE OF FIRST STRUCTURE;
	A=	0.000000	RANGE OF FIRST STRUCTURE (WHEN NOT LINEAR OR LOGARITHMIC);
	BIN=	0.00000	COSINE COEFFICIENT FOR FIRST STRUCTURE WHEN NST=0;
	CCC=	0.00000	Y-INTERCEPT TO BE USED ON ALL SIMULATED MODELS WHEN IC=1;
5	VAR=	10.487800	EXPERIMENTAL VARIANCE OF STUDIED VARIABLE;
	ESPI=	.00100000	SMALLEST DIFFERENCE ALLOWED BETWEEN SUCCESSIVE STANDARD ERRORS ON REPETITIVE MODELS;
6	TITRE=	TEST-DATA TAKEN FROM ME62200 OUTPUT FILE - LINEAR MODEL TESTED ONLY -	

SECTION 2 - INTERPRETATION OF A MODEL

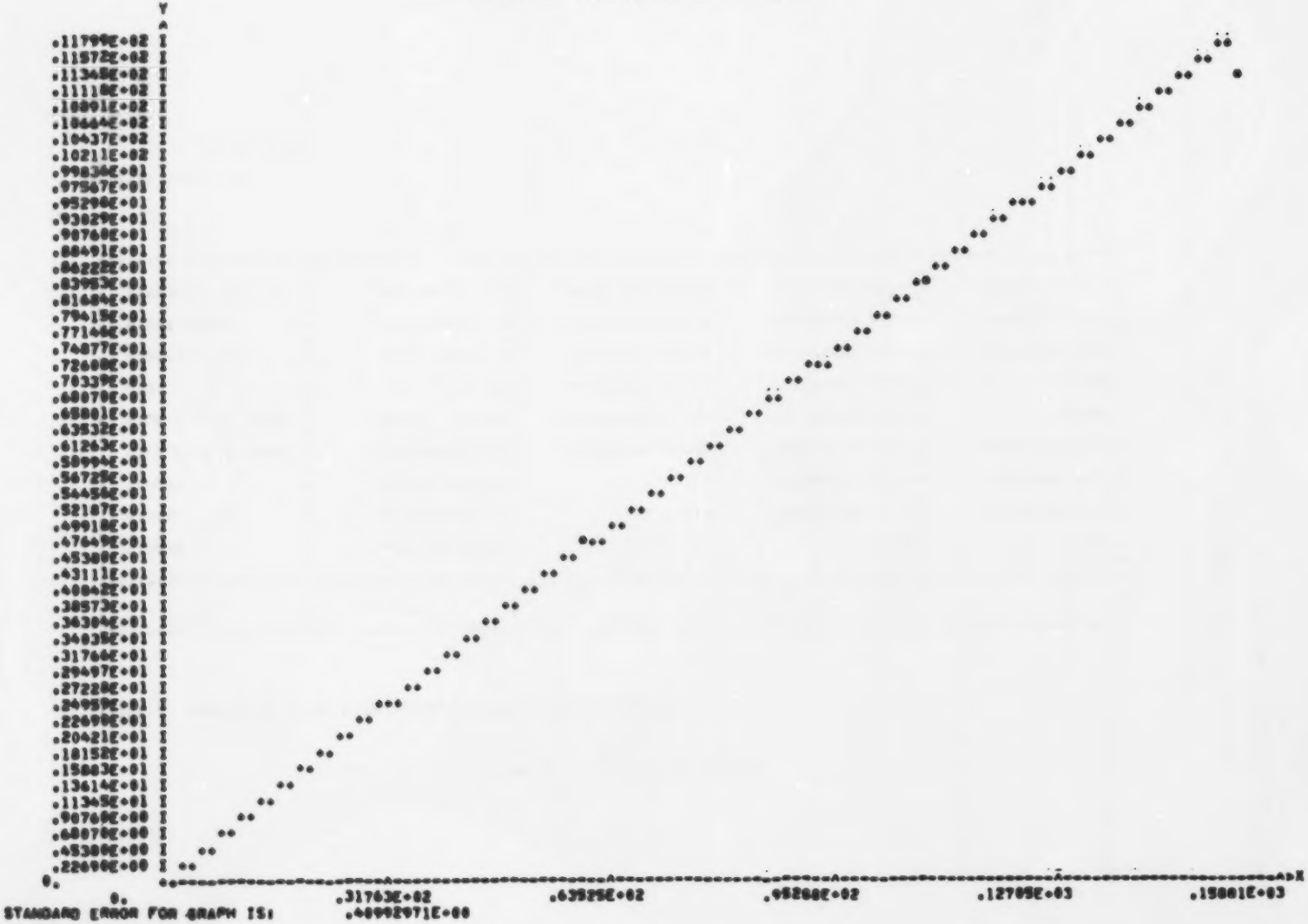
LINEAR MODEL

X-VALUE	Y (OBSERVATIONS)	Y (ESTIMATIONS)	NUMBER OF OBS.
50.23200	4.86750	4.64653	83
107.36000	8.32186	8.42199	101

THE VALUE OF ERROR-TYPE IS: .1673088108E+00

LINEAR MODEL Y = 0.000000 + .078446 *X

GRAPHICAL REPRESENTATION OF MODEL



STANDARD ERROR FOR GRAPH IS: .40992971E+00

SECTION 3 - SUMMARY OF RESULTS

TITLE = TEST-DATA TAKEN FROM MEG2200 OUTPUT FILE - LINEAR MODEL TESTED ONLY -

MODEL	E-T	CO	C	A
LINEAR	.167308810E+00	0.000000	.07845	1.000000
EXPONENTIAL	.999999999E+09	0.000000	999999999.000000	999999999.000000
SPHERICAL	.999999999E+09	0.000000	999999999.000000	999999999.000000
HOLE EFFECT (COS)	.999999999E+09	999999999.000000	999999999.000000	999999999.000000
HOLE EFFECT (SIN)	.999999999E+09	999999999.000000	999999999.000000	0.000000
LOG	.999999999E+09	999999999.000000	999999999.000000	1.000000
MODIFIED EXP.	.999999999E+09	999999999.000000	999999999.000000	999999999.000000
GAUSS MODEL	.999999999E+09	999999999.000000	999999999.000000	999999999.000000
COMBINED COS/EXP	.999999999E+09	999999999.000000	999999999.000000	999999999.000000

THE BEST MODEL IS:

LINEAR MODEL Y = 0.000000 + .078446 *X

REFERENCES

1. Sabourin, R.L., "Program MEG2010 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-102(TR), CANMET, Energy, Mines and Resources Canada; 1982.

2. Sabourin, R.L., "Program MEG2040 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-104(TR), CANMET, Energy, Mines and Resources Canada; 1982.

3. Sabourin, R.L., "Program MEG2050 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-105(TR), CANMET, Energy, Mines and Resources Canada; 1982.

4. Journel, A., Huijbregts, Ch. J., "Mining geostatistics"; Academic Press; 1978.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

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82–111 TR

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Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2300 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin
Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal reporting purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

Ce document est un rapport provisoire non révisé et rédigé principalement pour la discussion et la documentation internes. Il ne représente nullement l'opinion définitive du Centre canadien de la technologie des minéraux et de l'énergie (CANMET)

49 pp

ENERGY RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT ERP/MRL 82-111(TR)

PROGRAM MEG2300 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2300 is to use a kriging methodology for the evaluation of the average value of a variable wihin regular blocks, polygones or points. This program uses several kriging methodologies such as: cluster kriging, lognormal kriging, universal kriging and also the Jack Knife method of point kriging. Only one variable can be evaluated at a time. The regular blocks or points to be kriged must be identified by a two-dimensional matrix of blanking indicators. When a three-dimensional variable is evaluated, several levels of regular blocks may be evaluated successively during the same run using NPROB option.

The program prints all pertinent data involved in the evaluation of each point, block or polygon, followed by a scaled table. The input file of MEG2300 is provided by MEG2010, MEG2040, MEG2050 or by the user. All calculated results are stored on a permanent file which can be accessed by MEG2400 for a global reserve evaluation. The kriging estimators and variances are also stored on a permanent file to be used by a plotting program such as MEG2560.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

---

*Mining Geologist and Geostatistician, Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa.

GUIDE D'USAGER POUR LE PROGRAMME MEG2300
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2300 est d'utiliser une méthode de krigeage pour l'évaluation des valeurs moyennes d'une variable définie par des blocs réguliers, des polygones ou des points. Le programme utilise plusieurs méthodes de krigeage telles que: le krigeage en grappe, le krigeage lognormal, le krigeage universel ainsi que la méthode du krigeage des échantillons. Une seule variable peut être évaluée à la fois. Les blocs réguliers ou les points à évaluer doivent être identifiés par une matrice bi-dimensionnelle de nombres indiquant si ce bloc ou point doit être évalué ou non. Lorsqu'une variable tri-dimensionnelle est utilisée, plusieurs niveaux de blocs réguliers peuvent être évalués pendant l'exécution en utilisant l'option NPROB.

Le programme imprime d'abord toutes les données pertinentes impliquant l'évaluation de chaque point, bloc ou polygone, et ensuite un tableau à l'échelle de la variable évaluée. Le fichier d'entrée de MEG2300 est fourni par MEG2010, MEG2040, MEG2050 ou par l'utilisateur. Tous les résultats sont enregistrés sur fichiers permanents auxquels on peut avoir accès par MEG2400 pour une évaluation globale des réserves.

Les estimateurs de krigeage ainsi que les variances sont aussi enregistrés sur fichiers permanents pouvant être utilisés par un programme de traçage tel que MEG2560.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

---

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2300(IBLOC,ZBLOC,VBLOC,A,B,BB,X,Y,Z,V,URAG,
     -                   IDER,AUX,N,XXB,YYB,ZZB,XPB,YPB,ZPB,XS,YS,
     -                   VEC,ELL,K1,K2,K3,K4,K5,K6,K7,K8,K9,K10)
C*
C*
C*********************************************************************
C*                                                                   *
C*                                                                   *
C******GENERAL DESCRIPTION                                           *
C*                                                                   *
C*     MEG2300 APPLIES A SPECIFIC KRIGING METHODOLOGY FOR THE EVALUA- *
C*     TION OF THE AVERAGE VALUE OF A VARIABLE WITHIN REGULAR BLOCKS, *
C*     POLYGONS OR POINTS. THIS PROGRAM CAN USE SEVERAL KRIGING METHODS*
C*     E.G. BLOCK KRIGING, CLUSTER KRIGING, POINT KRIGING, LOGNORMAL  *
C*     KRIGING, UNIVERSAL KRIGING AND ALSO THE JACK KNIFE METHOD OF   *
C*     POINT KRIGING. ONLY ONE VARIABLE MAY BE EVALUATED AT A TIME.   *
C*                                                                   *
C*     THE USER MUST SUPPLY THE VARIOGRAM MODEL AND ITS PARAMETERS AS *
C*     WELL AS THE TYPE OF DRIFT COEFFICIENTS, IF UNIVERSAL KRIGING IS *
C*     USED. THE REGULAR BLOCKS OR POINTS TO BE KRIGED MUST BE IDENTI- *
C*     FIED BY A TWO-DIMENSIONAL MATRIX OF BLANKING INDICATORS. THE   *
C*     ONLY POINTS OR BLOCKS WHICH WILL BE EVALUATED WILL BE THOSE    *
C*     HAVING A BLANKING INDICATOR IDENTICAL TO ONE OF THE VALUES OF  *
C*     OPTION IBL (CARD 13). WHEN A THREE-DIMENSIONAL VARIABLE IS     *
C*     EVALUATED, SEVERAL LEVELS OF REGULAR BLOCKS MAY BE EVALUATED   *
C*     SUCCESSIVELY DURING THE SAME RUN USING NPROB OPTION.           *
C*     THE PROGRAM PRINTS ALL PERTINENT DATA INVOLVED IN THE          *
C*     EVALUATION OF EACH POINT, BLOCK OR POLYGON, FOLLOWED BY A      *
C*     SCALED TABLE (0.5,1.0,2.0,5.0 INCHES PER BLOCK) WHICH CAN THEN *
C*     BE OVERLAPPED ON A DRILL HOLE MAP. ALL CALCULATED RESULTS ARE  *
C*     STORED ON A PERMANENT FILE (PFNO=TAPE6) WHICH CAN BE ACCESSED BY*
C*     MEG2400 FOR A GLOBAL (TOTAL) RESERVE EVALUATION.               *
C*     WHEN BLOCKS OR POINTS ARE EVALUATED THE KRIGING ESTIMATORS AND *
C*     THE KRIGING VARIANCES ARE STORED RESPECTIVELY ON FILE TAPE10.  *
C*     THIS PROGRAM USES VARIABLE DIMENSIONS. MEG2300 IS WRITTEN IN CDC*
C*     FORTRAN LEVEL 4.8 AND WAS CREATED BY RAYMOND SABOURIN (EMR,    *
C*     CANMET,MRL), MAY 1982.                                        *
C*                                                                   *
C*********************************************************************
C*                                                                   *
C*                                                                   *
C*********************************************************************
C*                                                                   *
C*                                                                   *
C******VARIABLE DIMENSIONS                                           *
C*                                                                   *
C*     K1   - NUMBER OF BLOCKS OR POINTS ON Y-AXIS (POLYGONS K1=1);  *
C*     K2   - NUMBER OF BLOCKS OR POINTS ON X-AXIS (POLYGONS K2=1);  *
C*     K3   - DIMENSION OF KRIGING MATRIX (K3=K4+K5);                *
C*     K4   - ONE MORE THAN THE MAXIMUM NUMBER OF SAMPLES THAT WILL  *
C*            BE USED TO ESTIMATE A VARIABLE(.LE.MP);                *
C*     K5   - NUMBER OF DRIFT COEFFICIENTS (NTD);                    *
C*     K6   - NUMBER OF INTEGRATION POINTS WITHIN A BLOCK.           *
C*            K6= (NPBX*NPBY*NPBZ). K6=1 FOR POINTS OR POLYGONS;     *
C*     K7   - NUMBER OF INTEGRATION POINTS WITHIN A BLOCK OR A POLYGON *
C*            (K7=1 FOR POINTS). K7 = NPBX*NPBY*NPBZ;                *
C*     K8   - IF POLYGONS ARE EVALUATED (NMS=1) K8 IS THE LARGER     *
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C*            NUMBER (NSOM) OF POLYGON SUMMITS;
C*            IF BLOCKS ARE EVALUATED (NMS=2), K8=4 ;
C*            IF POINTS ARE EVALUATED (NMS=3 OR 4), K8=1 ;
C*      K9    - K9=K8*2+2 ;
C*      K10   - K10= (K3*(K3+1))/2
C*
C*****************************************************************************
C*
C*
C*****************************************************************************
C*
C*
C******OPTIONS READ ON INPUT
C*
C*      CARD 1 - IDE,IOT,IOI,NPBX,NPBY,NPBZ,ICLUST,LOG,IEP,MPM,IPB,NTD,
C*               IP,ICH,IFREE
C*               FORMAT READ IS (16I5)
C*          IDE     - TAPE UNIT NUMBER OF INPUT DATA FILE. DATA CAN BE
C*                    READ ON TAPE3 (PFNI),IDE=3 OR ON INPUT CARDS
C*                    (TAPE1),IDE=1,AFTER THE LAST OPTION CARD; DEFAULT
C*                    IS (TAPE3) IDE=3 ;
C*          IOT     - OPTION WHICH PERMITS USER TO RESTRAIN THE
C*                    EVALUATION.  IF IOT=0 A MAXIMUM OF K4-1 SAMPLES
C*                    AND A MINIMUM OF MPM SAMPLES WILL BE USED IN EACH
C*                    EVALUATION;
C*                    IF IOT=1, ALL SAMPLES WITHIN THE FIELD OF STUDY
C*                    ARE USED.
C*                    THE FIELD OF STUDY IS THE AREA COVERED BY THE
C*                    REGULAR BLOCKS, POINTS OR THE POLYGON IN ADDITION
C*                    TO THE PERIPHERAL ZONE DEFINED BY PMX,PMY AND PMZ.
C*                    (SEE OPTION CARD 12);
C*          IOI     - PRINTING OPTION;
C*                    IF IOI=1, THE PROGRAM PRINTS INFORMATION
C*                    PERTAINING TO THE SAMPLES USED FOR EACH EVALUATION.
C*                    IF IOI=0, SAMPLE INFORMATION IS NOT PRINTED;
C*          NPBX,NPBY,NPBZ - NUMBER OF INTEGRATION POINTS ALONG EACH
C*                    BLOCK DIMENSIONS;
C*                    WHEN A POLYGON IS EVALUATED, THE PROGRAM WILL
C*                    DEFINE THE DIMENSIONS OF THE SMALLEST BLOCK WHICH
C*                    CONTAINS THAT POLYGON.
C*                    EACH DIMENSION OF A BLOCK (SMALLEST BLOCK IN THE
C*                    CASE OF A POLYGON) IS DIVIDED RESPECTIVELY BY
C*                    NPBX,NPBY AND NPBZ,TO CREATE SMALLER UNIT BLOCKS.
C*                    THE MIDPOINTS(OR INTEGRATION POINT) OF THESE UNIT
C*                    BLOCKS (ONLY THE POINTS INSIDE THE POLYGON ARE
C*                    USED IN THE INTEGRATION) WILL BE USED
C*                    TO CALCULATE THE COVARIANCE BETWEEN ONE SAMPLE AND
C*                    THE BLOCK OR POLYGON WHICH IS EVALUATED.  WHEN
C*                    POINT KRIGING IS USED (NMS=3 OR 4)
C*                    NPBX=NPBY=NPBZ=1.
C*          ICLUST - OPTION TO APPLY CLUSTER KRIGING IN EVALUATING
C*                    REGULAR BLOCKS;
C*                    IF ICLUST.GT.0 OPTION IS USED;
C*                    IF ICLUST=0,OPTION IS NOT USED, DEFAULT IS ICLUST=0
C*                    REF. SEE, GEOSTATISTICAL ORE RESERVE EVALUATION,
C*                    MICHEL DAVID, P.292.
C*          LOG     - LOGNORMAL KRIGING OPTION;
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C*                IF LOG.GT.0, LOGNORMAL KRIGING WILL BE APPLIED;
C*                IN THIS CASE, THE REQUIRED LOGNORMAL VARIOGRAM
C*                MUST BE SUPPLIED; IF THE MEAN IS UNKNOWN, THE
C*                KRIGING VARIANCE IS TREATED AS A RELATIVE
C*                VARIANCE;
C*                IF LOG=0, OPTION IS NOT USED, DEFAULT IS LOG=0;
C*                REF. SEE. NORMAL AND LOGNORMAL ESTIMATION;
C*                JOUR. MATH. GEOL., V.11, P.407-422, RENDU,J.M.,1979
C*          IEP   - PROPORTIONAL EFFECT OPTION;
C*                IF IEP=0, OPTION IS NOT USED, DEFAULT IS IEP=0;
C*                IF IEP=1, ESTIMATED RELATIVE VARIANCE WILL BE
C*                MULTIPLIED BY A0 + AA*(LOCAL MEAN)**2  (SEE CARD 2)
C*                REF. SEE. MINING GEOSTATISTICS, P.250-251, JOURNEL,
C*                A.G. AND HUIJBREGTS, CH.J., 1978.
C*          MPM   - SMALLEST NUMBER OF SAMPLES TO BE USED IN AN
C*                EVALUATION (IOT=0); IF THE ZONE OF INFLUENCE FOR A
C*                GIVEN BLOCK OR POINT CONTAINS LESS THAN MPM
C*                SAMPLES, THEN THAT ZONE WILL BE ENLARGED TO
C*                INCLUDE MPM SAMPLES; IF THE ZONE CONTAINS MORE
C*                THAN K4-1 SAMPLES, THEN THAT ZONE WILL BE
C*                SHRINKED TO INCLUDE NO MORE THAN K4-1 SAMPLES;
C*                SELECTED SAMPLES WILL FALL WITHIN A ZONE OF
C*                INFLUENCE CORRESPONDING TO THE RANGE OF THE
C*                VARIOGRAM;
C*          IPB   - NUMBER OF BLOCKS WHICH ARE CONSIDERED TO BE PART
C*                OF THE PERIPHERY OF THE DEPOSIT;
C*                A PERIPHERAL BLOCK IS ONE WHICH IS ADJACENT TO THE
C*                BORDER OF THE DEPOSIT; E.G. IF IPB=2, THE TWO
C*                CLOSEST BLOCKS ADJACENT TO THE BOUNDARY OF THE
C*                DEPOSIT ARE PART OF THE PERIPHERAL ZONE;
C*                THESE BLOCKS WILL BE EVALUATED WITH STERILE (SEE
C*                OPTION ASTER) SAMPLE VALUES. NORMALLY IPB=1 OR 2.
C*                DEFAULT IS IPB=0;
C*                THIS OPTION IS USED WITH NMS=2 OR 3 BECAUSE THE
C*                BOUNDARY IS DEFINED BY THE BLANKING INDICATORS (SEE
C*                CARD 15)
C*          NTD   - NUMBER OF DRIFT COEFFICIENTS (SEE CARD 4);
C*                NTD =0 IF TMOY.GT.0.0;
C*          IP    - NUMBER OF VARIOGRAM MODELS INTERPRETED FROM
C*                THE EXPERIMENTAL VARIOGRAMS (SEE CARD 5);
C*                IP.LE.5; DEFAULT VALUE; IP=1;
C*          ICH   - WHEN ICH=0 , TWICE THE STANDARD DEVIATION (V2SD)
C*                OF THE KRIGING ESTIMATE WILL BE PRINTED,
C*                IF ICH=1, TWICE THE RELATIVE PRECISION OF THE
C*                KRIGING ESTIMATE WILL BE PRINTED INSTEAD OF V2SD
C*                THIS OPTION DOES NOT APPLY FOR A LOGNORMAL
C*                ESTIMATION; DEFAULT IS ICH=0,
C*          IFREE - OPTION IBLOC (SEE CARD 15, POINT OR BLOCK OPTIONS)
C*                MUST BE READ IN FREE FORMAT IF IFREE=1, OR IN
C*                CODED FORMAT IF IFREE=0,
C*                IF IFREE=0, CARD 14 MUST BE GIVEN,
C*
C*      CARD 2 - TMOY,VARI,ALFA,VARPB,A0,AA,AMIN,AMAX,ASTER
C*               FORMAT READ IS (2F10.3,2F5.0,5F10.3)
C*          TMOY  - AVERAGE VALUE OF THE VARIABLE WITHIN THE ORE BODY,
C*                IF THIS VALUE IS GIVEN, KRIGING WILL BE APPLIED
C*                WITH KNOWN MEAN (SEE CARD 4);
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C*          VARI   - ARITHMETIC VARIANCE OF THE VARIABLE WITHIN THE      *
C*                   ORE BODY;                                          *
C*                   FOR LOGNORMAL KRIGING (I.E. LOG.GT.0) AND FOR      *
C*                   POINT KRIGING (I.E. NMS=3,4) VARI MUST BE          *
C*                   SPECIFIED; WHEN LOGNORMAL KRIGING IS APPLIED,      *
C*                   VARI REPRESENTS THE LOGARITHMIC VARIANCE OF        *
C*                   THE VARIABLE WITHIN THE ORE BODY;                  *
C*          ALFA   - HORIZONTAL ANGLE OF ROTATION OF THE COORDINATE     *
C*                   SYSTEM FROM THE X AXIS. COUNTERCLOCKWISE ROTATIONS *
C*                   ARE POSITIVE. THIS OPTION GIVES THE POSSIBILITY TO *
C*                   EVALUATE REGULAR BLOCKS OR POINTS WHICH ARE ROTATED*
C*                   FROM THE COORDINATE SYSTEM;                        *
C*          VARPB  - VARIANCE OF A UNIT BLOCK WITHIN THE DEPOSIT;       *
C*                   WHEN LOGNORMAL KRIGING IS USED VARPB IS A          *
C*                   LOGNORMAL VARIANCE;                                *
C*                   IF NOT SPECIFIED, A VALUE WILL BE DETERMINED BY    *
C*                   THE PROGRAM;                                       *
C*          A0,AA  - WHEN A RELATIVE VARIOGRAM IS USED (IEP=1), THESE   *
C*                   VALUES REPRESENT THE COEFFICIENTS USED TO CALCULATE*
C*                   THE LOCAL VARIANCE. WHEN UNSPECIFIED, A0 IS SET TO *
C*                   ZERO AND AA TO ONE;                                *
C*          AMIN,AMAX - RANGE OF ACCEPTABLE VARIABLE VALUES (V1);       *
C*                   THESE LIMITS ARE NOT REJECTED; IF UNSPECIFIED, ALL *
C*                   ZERO AND POSITIVE VALUES ARE USED FOR THE          *
C*                   EVALUATION;                                        *
C*          ASTER  - SMALLEST VARIABLE VALUE THAT IS TO BE CONSIDERED   *
C*                   STERILE (SEE OPTION IPB); DEFAULT VALUE;           *
C*                   ASTER=AMIN;                                        *
C*                                                                      *
C*      CARD 3 - TEXT(8);                                               *
C*               FORMAT READ IS (8A10);                                 *
C*           TEXT   - REFERENCE TITLE FOR OUTPUT LISTING;               *
C*                                                                      *
C*      CARD 4 - IDER(I),I=1,NTD                                        *
C*               FORMAT READ IS (16I5);                                 *
C*               CARD IS NOT READ IF NTD=0 OR IF TMOY.GT.0.0;           *
C*           IDER   - ARRAY CONTAINING THE SELECTED DRIFT COEFFICIENTS; *
C*                    VALUES ARE;      0 - COEFFICIENT IS 1;           *
C*                                     1 - COEFFICIENT IS X;           *
C*                                     2 - COEFFICIENT IS Y;           *
C*                                     3 - COEFFICIENT IS Z;           *
C*                                     4 - COEFFICIENT IS X**2;        *
C*                                     5 - COEFFICIENT IS Y**2;        *
C*                                     6 - COEFFICIENT IS Z**2;        *
C*                                     7 - COEFFICIENT IS X*Y;         *
C*                                     8 - COEFFICIENT IS X*Z;         *
C*                                     9 - COEFFICIENT IS Y*Z;         *
C*               IF NTD=1 AND IDER(1)=0, NORMAL KRIGING WILL BE USED    *
C*               AND THE SUPPLIED VARIOGRAM PARAMETERS ARE FOR THE SEMI-*
C*               VARIOGRAM. OTHERWISE, UNIVERSAL KRIGING WILL BE USED   *
C*               AND THE SUPPLIED VARIOGRAM PARAMETERS WILL BE FOR THE  *
C*               UNDERLYING OR RESIDUAL VARIOGRAM;                      *
C*                                                                      *
C*      CARD 5 - IVAR(I),I=1,IP                                         *
C*               FORMAT READ IS (16I5);                                 *
C*           IVAR   - ARRAY CONTAINING THEORETICAL MODELS APPLICABLE TO *
C*                    EACH OF THE SUPERIMPOSED VARIOGRAMS;              *
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C*                  VALUES ARE:        1 - LINEAR TRANSITIVE MODEL;      *
C*                                     2 - SPHERICAL MODEL;              *
C*                                     3 - EXPONENTIAL MODEL;            *
C*                                     4 - HOLE EFFECT, COSINE MODEL;    *
C*                                     5 - HOLE EFFECT, SINE MODEL;      *
C*                                     6 - COMBINED COSINE/EXPONENTIAL   *
C*                                         MODEL;                        *
C*                  SEE SUBROUTINE MEG2315 FOR EXACT MODEL FORMULAS;     *
C*                                                                       *
C*     CARD 6 - CO,(CC(I),I=1,IP)                                        *
C*              FORMAT READ IS (8F10.3);                                 *
C*         CO     - NUGGET EFFECT OF THE THEORETICAL MODELS;             *
C*         CC     - ARRAY CONTAINING THE SILL VALUES FOR EACH OF THE     *
C*                  SUPERIMPOSED VARIOGRAMS;                             *
C*                  THE VALUE OF CO+CC IS NORMALLY GREATER THAN THE      *
C*                  VALUE OF VARI, THE VARIANCE OF THE SAMPLE VALUES;    *
C*                  FOR A LINEAR TRANSITIVE MODEL (CO+CC) REPRESENTS     *
C*                  THE VALUE OF THE SEMI-VARIOGRAM FOR DISTANCES EQUAL*
C*                  TO THE RANGE (AAPP((3,4 OR 5),L)).                   *
C*                  IF ONE WANTS TO USE A LARGER RANGE, THEN (CO+CC)     *
C*                  WILL HAVE TO BE CHANGED CORRESPONDINGLY;             *
C*                                                                       *
C*     CARD 7 - ((AAPP(I,L),I=1,5),PP(L),L=1,IP1)                        *
C*              FORMAT READ IS (6F10.5);                                 *
C*              IP1 = IP + 1 IF IP.GT.1;                                 *
C*              IP1 = IP WHEN IP=1;                                      *
C*              THE SAMPLES AROUND EACH BLOCK, POINT OR POLYGON TO BE    *
C*              EVALUATED WILL BE SELECTED ACCORDING TO THE ZONE OF      *
C*              INFLUENCE DEFINED BY (AAPP(I,IP1),I=1,5).                *
C*              FOR IP1=1, THIS ZONE OF INFLUENCE CORRESPONDS TO THE     *
C*              RANGE OF THE VARIOGRAM IN ALL DIRECTIONS.                *
C*              IF IP1.GT.1 (I.E. MULTI-STRUCTURAL VARIOGRAM MODEL)      *
C*              THE USER MUST PROVIDE (L=IP1) A UNIQUE ZONE OF           *
C*              INFLUENCE.                                               *
C*         AAPP   - ARRAY CONTAINING THE RANGE SPECIFICATIONS FOR        *
C*                  EACH THEORETICAL MODEL;                              *
C*                  AAPP(1,L): ANGLE BETWEEN THE X AXIS AND THE HORIZON*
C*                             TAL PROJECTION OF THE GREATEST RANGE      *
C*                             OF THE L-TH VARIOGRAM MODEL;              *
C*                             THIS IS THE TETA ANGLE IN THE SPHERICAL   *
C*                             COORDINATES SYSTEM.                       *
C*                  AAPP(2,L): ANGLE BETWEEN THE GREATEST RANGE AND      *
C*                             ITS HORIZONTAL PROJECTION;                *
C*                             THIS IS THE COMPLEMENT (90-PHI) OF THE    *
C*                             PHI ANGLE IN THE SPHERICAL COORDINATES    *
C*                             SYSTEM;                                   *
C*                  AAPP(3,L): GREATEST RANGE LENGTH IN THE DIRECTION    *
C*                             DETERMINED BY THE TWO PREVIOUS ANGLES;    *
C*                             IF THE THEORETICAL MODEL IS SPHERICAL,    *
C*                             TWO-THIRDS OF THE RANGE VALUE MUST BE     *
C*                             USED;                                     *
C*                  AAPP(4,L): SECOND RANGE LENGHT. THIS SECOND RANGE    *
C*                             IS IN THE HORIZONTAL PLANE AND IS PER-    *
C*                             PENDICULAR TO AAPP(3,L).                  *
C*                  AAPP(5,L): THIRD RANGE LENGHT. THIS THIRD RANGE IS   *
C*                             PERPENDICULAR TO THE PLANE DEFINED BY     *
C*                             AAPP(3,L) AND AAPP(4,L);                  *
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C*                  AAPP(2,L) AND AAPP(5,L) MUST BE EQUAL TO ZERO FOR  *
C*                  A TWO-DIMENSIONAL VARIABLE;                        *
C*                  FOR A SPHERICAL VARIOGRAM MODEL, AAPP(3,L),        *
C*                  AAPP(4,L) AND AAPP(5,L) REPRESENT TWO THIRD OF THE *
C*                  RANGES.                                            *
C*        PP      - ARRAY CONTAINING THE EXPONENT USED FOR THE LINEAR  *
C*                  (IVAR=1) OR COMBINED (IVAR=6) MODELS; (SEE SUBROU- *
C*                  TINE MEG2315)                                      *
C*                  PP(L) SHOULD BE EQUAL TO 1.0 FOR A STRICKLY LINEAR *
C*                  MODEL. IF IVAR=1, PP(L) SHOULD ALWAYS BE .GT.0.0   *
C*                  AND .LE.2.0 IF ONE WANTS A POSITIVE DEFINITE MODEL.*
C*                                                                     *
C*     CARD 8 - FTN(8);                                                *
C*              FORMAT READ IS (8A10);                                 *
C*        FTN     - FORMAT OF INPUT DATA TO BE READ FROM TAPE(IDE);    *
C*                  READING STATEMENT IS:                              *
C*                  READ(IDE,FTN) URAG1,X1,Y1,Z1,V1,N1,IR              *
C*                  (SEE VARIABLES USED)                               *
C*                  DEFAULT FORMAT OF FTN IS:                          *
C*                        (3X,I4,3F10.3,30X,F10.3,10X,2I1)             *
C*                  THE DEFAULT FORMAT IS USED WHEN THE INPUT DATA     *
C*                  FILE IS CREATED BY PROGRAM MEG2010. IN THIS CASE,  *
C*                  METAL PER UNIT AREA IS THE VARIABLE TO BE EVALUA-  *
C*                  TED.                                               *
C*                                                                     *
C*     CARD 9 - NPROB;                                                 *
C*              FORMAT READ IS (I5);                                   *
C*        NPROB   - NUMBER OF DIFFERENT PROBLEMS THE EIGHT PRECEDING   *
C*                  OPTIONS WILL BE APPLIED TO;                        *
C*                  EACH POLYGON EVALUATION IS CONSIDERED A NEW PROBLEM*
C*                  WHEN BLOCKS OR POINTS ARE EVALUATED, EACH NEW      *
C*                  LEVEL OF BLOCKS IS TAKEN AS A DIFFERENT PROBLEM;   *
C*                                                                     *
C*      THE FOLLOWING CARDS ARE REPEATED FOR EACH PROBLEM              *
C*      --- --------- ----- --- -------- --- ---- -------              *
C*                                                                     *
C*     CARD 10 - NMS,MP                                                *
C*              FORMAT READ IS (16I5)                                  *
C*        NMS     - EVALUATION OPTION;                                 *
C*                  IF NMS=1, A POLYGON IS EVALUATED;                  *
C*                  IF NMS=2, A REGULAR GRID OF BLOCKS IS EVALUATED;   *
C*                  IF NMS=3, A REGULAR GRID OF POINTS IS EVALUATED;   *
C*                  IF NMS=4 ACTUAL SAMPLES ARE EVALUATED AND IOT MUST *
C*                  BE EQUAL TO ZERO. THIS IS CALLED THE JACK KNIFE    *
C*                  PROCEDURE.                                         *
C*                  THE OBJECTIVE OF THE JACK KNIFE PROCEDURE IS TO    *
C*                  DETERMINE WHETHER THE EVALUATION METHOD USED IS    *
C*                  SATISFACTORY. THE JACK KNIFE PROCEDURE CONSISTS IN *
C*                  EVALUATING EACH KNOWN SAMPLE VALUE BY ITS          *
C*                  SURROUNDING SAMPLES.  THE EVALUATED SAMPLE VALUE   *
C*                  DOES NOT TAKE PART IN THE EVALUATION, SO THE TRUE  *
C*                  ESTIMATION ERRORS FOR ALL SAMPLE POINTS MAY BE     *
C*                  CALCULATED AND COMPARED WITH THE STANDARD DEVIATION*
C*                  OF THE KRIGING VARIANCE. IF MORE THAN FIVE PER CENT*
C*                  OF THE TRUE ESTIMATION ERRORS ARE FOUND OUTSIDE    *
C*                  THE PREDICTED NINETY-FIVE PER CENT CONFIDENCE      *
C*                  INTERVAL OF EACH KRIGING ESTIMATOR, THEN IT IS     *
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C*                  CONCLUDED THAT THE ESTIMATION METHOD USED IS NOT      *
C*                  SATISFACTORY.                                         *
C*        MP      - MAXIMUM NUMBER OF SAMPLES TO BE READ FROM DATA        *
C*                  FILE;                                                 *
C*                                                                        *
C*         ** POLYGON OPTIONS **       (NMS=1)                            *
C*                                                                        *
C*     CARD 11 - NPOLYG, NSOM;                                            *
C*               FORMAT READ IS (A10,I5);                                 *
C*         NPOLYG - CHARACTER STRING USED TO IDENTIFY POLYGON;            *
C*         NSOM   - NUMBER OF POLYGON SUMMITS;                            *
C*                                                                        *
C*     CARD 12 - ZINF,ZSUP,PMX,PMY,PMZ                                    *
C*               FORMAT READ IS (8F10.3)                                  *
C*         ZINF   - LOWER ELEVATION OF POLYGON;                           *
C*         ZSUP   - UPPER ELEVATION OF POLYGON;                           *
C*                  ZINF=ZSUP=0.0 WHEN EVALUATING A TWO-DIMENSIONAL       *
C*                  VARIABLE;                                             *
C*         PMX,PMY,PMZ - VALUES USED TO DEFINE A PERIPHERAL ZONE          *
C*                  OUTSIDE THE TOTAL AREA OR VOLUME TO BE EVALUATED.     *
C*                  ALL SAMPLES FOUND WITHIN EITHER THIS ZONE OR THE      *
C*                  TOTAL ESTIMATED AREA OR VOLUME WILL BE USED FOR       *
C*                  THE EVALUATION. IF A TWO-DIMENSIONAL VARIABLE IS      *
C*                  EVALUATED, PMZ=0.0;                                   *
C*                                                                        *
C*     CARD 13 - (XS(I),YS(I),I=1,NSOM)                                   *
C*               FORMAT READ IS (8F10.3)                                  *
C*         XS,YS  - CORRESPONDING COORDINATES FOR EACH POLYGON SUMMIT;     *
C*                  THESE COORDINATES ARE READ IN CLOCKWISE ORDER;         *
C*                                                                        *
C*         N.B. WHEN IDE=1, IMMEDIATLY FOLLOWING OPTION CARD 13,          *
C*              MP CARDS SHOULD BE READ USING FORMAT FTN.                 *
C*              THESE MP CARDS ARE READ ONLY FOR THE FIRST PROBLEM;       *
C*                                                                        *
C*         ** POINT AND BLOCK OPTIONS **       (NMS=2,3, OR 4)            *
C*                                                                        *
C*     CARD 11 - NX,NY,XIX,YIY,ZIZ,ECH                                    *
C*               FORMAT READ IS (2I5,7F10.3)                              *
C*         NX,NY  - NUMBER OF POINTS OR BLOCKS ALONG BOTH GRID AXIS       *
C*                  RESPECTIVELY;                                         *
C*                  THE ESTIMATED POINTS ARE THE CORNERS OF GRID CELLS.   *
C*                  WHEN POINTS ARE EVALUATED, NX AND NY REPRESENT THE    *
C*                  NUMBER OF GRID CELLS +1 RESPECTIVELY FOR EACH AXIS;   *
C*                  WHEN BLOCKS ARE EVALUATED,NX AND NY REPRESENT         *
C*                  EXACTLY THE NUMBER OF BLOCKS ALONG EACH AXIS.         *
C*                  IF NMS=1 OR 4 , NX=NY=1;                              *
C*         XIX,YIY,ZIZ - THESE VALUES REPRESENT THE DIMENSIONS OF         *
C*                  THE ESTIMATED BLOCKS OR THE GRID CELL DIMENSIONS       *
C*                  WHEN POINTS ARE ESTIMATED(IN THIS CASE ZIZ=0.0);      *
C*                  IF NMS=4, XIX=YIY=ZIZ=0.0                             *
C*         ECH    - SCALE TO BE USED IN PRINTING EVALUATED BLOCKS OR      *
C*                  POINTS ON OUTPUT; IF ECH=1.0, ONE SQUARE INCH IS      *
C*                  USED PER BLOCK. ECH CAN ONLY BE EQUAL TO 0.5, 1.0,    *
C*                  2.0 OR 5.0. DEFAULT VALUE OF ECH IS 1.0;              *
C*                                                                        *
C*     CARD 12 - XREF,YREF,ZREF,PMX,PMY,PMZ                               *
C*               FORMAT READ IS (8F10.3)                                  *
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C*          XREF,YREF,ZREF - COORDINATES FOR THE REFERENCE POINT OF
C*                   A GRID OF REGULAR BLOCKS OR POINTS.
C*                   REFERENCE POINT IS LOCATED AT THE LOWER LEFT
C*                   CORNER OF GRID;
C*                   ZREF IS THE LOWER ELEVATION OF BLOCKS (WHEN A
C*                   THREE-DIMENSIONAL VARIABLE IS EVALUATED).
C*                   WHEN A TWO-DIMENSIONAL VARIABLE IS EVALUATED ZREF=0.
C*          PMX,PMY,PMZ - VALUES USED TO DEFINE A PERIPHERAL ZONE
C*                   OUTSIDE THE TOTAL AREA OR VOLUME TO BE EVALUATED.
C*                   ALL SAMPLES FOUND WITHIN EITHER THIS ZONE OR THE
C*                   TOTAL ESTIMATED AREA OR VOLUME WILL BE USED FOR
C*                   THE EVALUATION. IF A TWO-DIMENSIONAL VARIABLE IS
C*                   EVALUATED, PMZ=0.0;
C*
C*       CARD 13 - NTYPE,(IBL(I),I=1,NTYPE)
C*                 FORMAT READ IS (16I5)
C*            NTYPE  - NUMBER OF DIFFERENT TYPES OF BLOCKS TO BE EVALUATED
C*                     (MAX 15)
C*            IBL    - INDICATORS FOR THE ACCEPTED BLOCKS(INTEGER VALUES);
C*
C*       CARD 14 - IDA,HTN(7)
C*                 NOT READ WHEN IFREE=1.
C*                 FORMAT READ IS (I10,7A10)
C*            IDA    - BLOCK INDICATORS (IBLOC) ARE STORED ON FILE(PFNI2)
C*                     NUMBER IDA. WHEN IDA=1, INDICATORS ARE ON INPUT
C*                     DATA CARDS.
C*                     WHEN IDA=12, INDICATORS ARE STORED ON DISK FILE
C*                     (TAPE12). THIS FILE WILL BE REWIND AFTER EACH
C*                     PROBLEM.
C*            HTN    - CODED FORMAT FOR THE FOLLOWING BLOCK INDICATORS
C*                     (IBLOC). IFREE MUST BE ZERO.
C*
C*       CARD 15 - ((IBLOC(I,J),J=1,NX),I=1,NY)
C*                 FORMAT READ IS HTN.
C*                 BLOCK INDICATORS CAN BE READ EITHER IN CODED FORMAT
C*                 (IFREE=0) OR IN FREE FORMAT (IFREE=1).
C*                 CODED FORMAT IS GIVEN BY HTN. IN THIS CASE THE USER
C*                 CAN READ THE BLOCK INDICATORS ON INPUT DATA CARDS
C*                 (IDA=1) OR ON DISK FILE (TAPE12) (IDA=12).
C*                 HTN SHOULD ONLY SPECIFY ONE LINE OF BLOCK INDICATORS.
C*            IBLOC  - ARRAY CONTAINING INDICATORS FOR BLOCKS OR POINTS.
C*                     IF IBLOC(I,J).EQ.IBL, THAT BLOCK OR POINT IS
C*                     EVALUATED;
C*                     IF IBLOC(I,J).NE.IBL, THAT BLOCK OR POINT IS NOT
C*                     EVALUATED;
C*                     E.G. IF NX=3, NY=3, IFREE=1, NTYPE=1 AND IBL(1)=1,
C*                     THAN CARD 15 CONTAINS;
C*                     1 2*0 3*1 0 2*1
C*                     THE CORRESPONDING MATRIX OF      1   0   0
C*                     INDICATORS FOR BLOCKS OR         1   1   1
C*                     POINTS IS;                       0   1   1
C*
C*                     THE INDICATORS REPRESENTS BLOCKS OR POINTS READ
C*                     FROM LEFT TO RIGHT AND FROM TOP TO BOTTOM.
C*                     THE ABOVE INDICATORS SHOW THAT SIX OUT OF NINE
C*                     BLOCKS OR POINTS WILL BE EVALUATED;
C*
```

```
C*          N.B. WHEN IDE=1, IMMEDIATLY FOLLOWING OPTION CARD 15,
C*               MP CARDS SHOULD BE READ USING FORMAT FTN.
C*               THESE MP CARDS ARE READ ONLY FOR THE FIRST PROBLEM;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C*
C******VARIABLES USED
C*
C*      URAG1  - INTEGER SAMPLE NUMBER;
C*      X1,Y1,Z1 - SAMPLE COORDINATES (OR DEPARTURE, LATITUDE AND
C*                 ELEVATION);
C*      V1     - VARIABLE VALUE;
C*      N1     - NUMBER OF SAMPLES TAKEN TO EVALUATE V1 (USED ONLY FOR
C*               CLUSTER KRIGING, OTHERWISE N1 MUST BE READ AS ZERO);
C*      IR     - REJECTION INDICATOR;
C*               IF IR=0, SAMPLE IS KEPT;
C*               IF IR=1, SAMPLE IS REJECTED;
C*
C******DESCRIPTION OF PARAMETERS
C*
C*      IBLOC       - BLANKING INDICATORS (SEE OPTION CARD 15)
C*      ZBLOC       - ARRAY OF KRIGING ESTIMATORS FOR BLOCKS OR POINTS
C*      VBLOC       - ARRAY OF TWICE THE STANDARD DEVIATION (OR TWICE
C*                    THE RELATIVE PRECISION) OF THE KRIGING VARIANCE
C*                    FOR BLOCKS OR POINTS
C*      A           - MATRIX OF COEFFICIENTS IN THE KRIGING SYSTEM OF
C*                    EQUATIONS
C*      B,BB        - MATRIX OF CONSTANTS IN THE KRIGING SYSTEM OF
C*                    EQUATIONS. AFTER THE SOLUTION OF THE KRIGING
C*                    SYSTEM OF EQUATIONS, B WILL CONTAIN THE KRIGING
C*                    WEIGHTING COEFFICIENTS.
C*      X,Y,Z,V,URAG - SAME AS X1,Y1,Z1,V1 AND URAG1. HOWEVER,THESE
C*                     ARE DIMENSIONED VARIABLES AND WILL DEFINE THE
C*                     COORDINATES, THE VALUE AND THE SAMPLE NUMBER FOR
C*                     EACH SAMPLE WITHIN THE ZONE OF INFLUENCE (SEE
C*                     OPTION CARD 7 FOR IP1) OF A BLOCK, POINT OR
C*                     POLYGON.
C*      IDER        - SEE OPTION CARD 4 FOR DRIFT COEFFICIENTS
C*      AUX         - AUXILIARY STORAGE UNIT FOR MEG2316
C*      N           - SAME AS N1. IT IS A DIMENSIONED VARIABLE GIVING
C*                    THE NUMBER OF SAMPLES USED TO EVALUATE V (CLUSTER
C*                    ANALYSIS)
C*      XXB,YYB,ZZB - RELATIVE COORDINATES OF INTEGRATION POINTS WITHIN
C*                    A BLOCK. THESE POINTS ARE USED TO CALCULATE THE
C*                    COVARIANCE BETWEEN A SAMPLE AND A BLOCK.
C*      XPB,YPB,ZPB - TRUE COORDINATES OF INTEGRATION POINTS WITHIN
C*                    A BLOCK OR A POLYGON.
C*      XS,YS       - COORDINATES OF POLYGON SUMMITS.(SEE OPTION CARD 13
C*                    FOR POLYGONS)
C*      VEC         - ARRAY ALSO CONTAINING THE COORDINATES OF POLYGON
C*                    SUMMITS (USED IN MEG2309).
C*      K1 TO K10   - VARIABLE DIMENSIONS
C*
```

```
      C*****************************************************************
      C*                                                               *
      C*                                                               *
      C*****************************************************************
      C*                                                               *
      C*                                                               *
      C******REQUIRED SUBROUTINES                                      *
      C*                                                               *
      C*     MEG2301    - TO CALCULATE PROJECTION VECTORS OF THE ZONE OF *
      C*                  INFLUENCE.                                   *
      C*     MEG2302    - TO DEFINE THE COORDINATES OF INTEGRATION POINTS *
      C*                  AND TO CALCULATE THE VARIANCE OF A BLOCK OR POLY- *
      C*                  GON WITHIN THE DEPOSIT.                      *
      C*     MEG2303    - TO CALCULATE THE SURFACE OF A POLYGON OR A BLOCK *
      C*     MEG2304    - TO CALCULATE NEW COORDINATES AFTER A ROTATION OF *
      C*                  X/Y AXIS.                                    *
      C*     MEG2305    - TO ACCEPT ONLY THOSE SAMPLES INSIDE THE TOTAL  *
      C*                  AREA OR VOLUME COVERED BY THE EVALUATED POINTS, *
      C*                  BLOCK OR POLYGON EXTENDED ON EACH SIDE BY THE *
      C*                  DISTANCES PMX,PMY AND PMZ.                   *
      C*     MEG2306    - TO FIND THOSE SAMPLES INSIDE THE ZONE OF INFLUENCE *
      C*                  OF A POINT, BLOCK OR POLYGON TO BE EVALUATED *
      C*     MEG2307    - TO DEFINE THE MATRIX OF COEFFICIENTS AND OF    *
      C*                  CONSTANTS FOR THE KRIGING SYSTEM OF EQUATIONS. *
      C*     MEG2308    - TO PRINT SCALED TABLES OF ESTIMATED POINTS OR  *
      C*                  BLOCKS.                                      *
      C*     MEG2316    - TO SOLVE THE KRIGING SYSTEM OF EQUATIONS       *
      C*                                                               *
      C*****************************************************************
      C*                                                               *
      C*                                                               *
      C*****************************************************************
      C*                                                               *
      C*                                                               *
      C******FILES USED                                                *
      C*                                                               *
      C*     TAPE1 - INPUT DATA CARDS (OPTIONAL CARDS AND SAMPLE DATA,IDE=1) *
      C*     TAPE2 - OUTPUT LISTING                                    *
      C*         SECTION -1- OPTIONS APPLIED                           *
      C*         SECTION -2- COMPUTATION OF BLOCK VARIANCE WITHIN DEPOSIT *
      C*         SECTION -3- LIST OF INPUT DATA                        *
      C*         SECTION -4- DETAILED KRIGING RESULTS                  *
      C*         SECTION -5- SCALED TABLES OF KRIGING RESULTS          *
      C*     TAPE3 - INPUT DATA FILE (IDE=3) (PFNI)                    *
      C*     TAPE5,7,8 - SCRATH FILES                                  *
      C*     TAPE6 - OUTPUT DATA FILE(PFNO) OF COMPLETE MEG2300 RESULTS. *
      C*             THIS FILE WILL BE USED BY MEG2400.                *
      C*     TAPE9 - OUTPUT DATA FILE(PFNO2) FOR THE JACK KNIFE METHOD(NMS=4) *
      C*     TAPE10 - OUTPUT DATA FILE(PFNO3) OF KRIGING ESTIMATORS FOR *
      C*              POINTS OR BLOCKS. THIS FILE WILL BE USED EITHER BY *
      C*              MEG2500 OR MEG2560.                              *
      C*     TAPE11 - OUTPUT DATA FILE(PFNO4) OF KRIGING VARIANCES FOR POINTS *
      C*              OR BLOCKS. THIS FILE WILL BE USED EITHER BY MEG2500 OR *
      C*              MEG2560.                                         *
      C*     TAPE12 - INPUT DATA FILE FOR BLOCK INDICATORS (IBLOC) (PFNI2) *
      C*                                                               *
      C*****************************************************************
```

```
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******EXECUTION                                                       *
C*                                                                      *
C*      H2300,CM75000,IO500,T100,P2.                                    *
C*      ACCOUNT,*****,PW=******.                                        *
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,Pw=***,MR=1.                  *
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2300,                              *
C*      PFNI=PERMANENT FILE NAME OF MEG2010 OUTPUT FILE OR ANY OTHER    *
C*           FILE CREATED BY THE USER.(SEE DATA FORMAT FTN)             *
C*      PFNO=PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE(TAPE6)     *
C*      PFNO2=PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE(TAPE9)    *
C*      PFNO3=PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE(TAPE10)   *
C*      PFNO4=PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE(TAPE11)   *
C*      Q1=K1,Q2=K2 ECT... (SEE VARIABLE DIMENSIONS)                    *
C*                                                                      *
C************************************************************************
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******DECLARATIONS                                                    *
C*                                                                      *
C************************************************************************
C*                                                                      *
C*                                                                      *
      REAL ZBLOC(K1,K2),VBLOC(K1,K2),A(K10),B(K3),BB(K3),Y(K4),
     -     X(K4),Z(K4),V(K4),AUX(K3),XXB(K6),YYB(K6),ZZB(K6),XPB(K7),
     -     YPB(K7),ZPB(K7),XS(K8),YS(K8),VEC(K9),ELL(K4)
      INTEGER IBLOC(K1,K2),IDER(K5),N(K4),URAG(K4)
      INTEGER ETN(8),FTN(8),TEXT(8),GTN(8),URAG1,HTN(7),IBL(15)
      INTEGER URTMY
C*                                                                      *
C******COMMON AREAS                                                   *
C*                                                                      *
      COMMON IP,CO,CC(5),AAPP(5,5),PI,IVAR(5),NPBX,NPBY,NPBZ,HMOY,
     - ICLUST,IP1,PP(5)
      COMMON /UN/NX,NY,NZ,XIX,YIY,ZIZ,PMX,PMY,PMZ,XREF,YREF,ZREF
      COMMON /DEUX/ PX,PY,PZ,XPX,YPX,ZPX,XPY,YPY,ZPY,XPZ,YPZ,ZPZ
      COMMON /TROIS/LOG,XYMX,XYMY,XYMZ
C*                                                                      *
C*                                                                      *
C************************************************************************
C*                                                                      *
C******MAIN BODY OF MEG2300                                            *
C*                                                                      *
C************************************************************************
C*
C*
C******INITIALIZATION
C*
      IOT1=0
      PI=3.1415926535
C*
C******FIRST NINE OPTION CARDS ARE READ
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

MEG2300 - OPTION CARDS

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CARD NO. 1

IDE	IOT	IOI	NPBX	NPBY	NPBZ	ICLUST	LOG	IEP	MPM
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50

IPB	NTD	IP	ICH	IFREE
51 — 55	56 — 60	61 — 65	66 — 70	71 — 75

FORMAT(16I5)

CARD NO. 2

TMOY	VARI	ALFA	VARPB	AO	AA	AMIN	AMAX	ASTER
1 — 10	11 — 20	21 — 25	26 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80

FORMAT(8F10.3)

CARD NO. 3

(TEXT(I),I=1,8) FORMAT(8A10)

1 — 80

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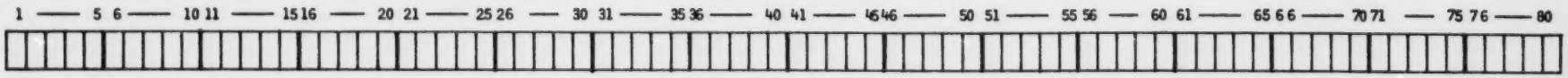
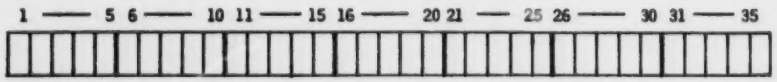
CARD NO. 4

(IDER(I),I=1,NTD) FORMAT(16I5)



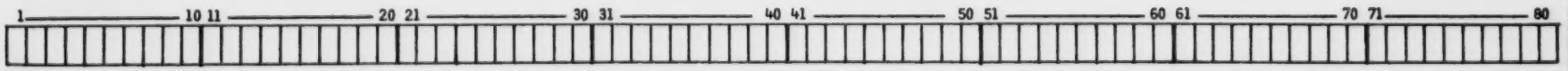
CARD NO. 5

(IVAR(I),I=1,IP) FORMAT(16I5)



CARD NO. 6

CO (CC(I),I=1,IP) FORMAT(8F10.3)



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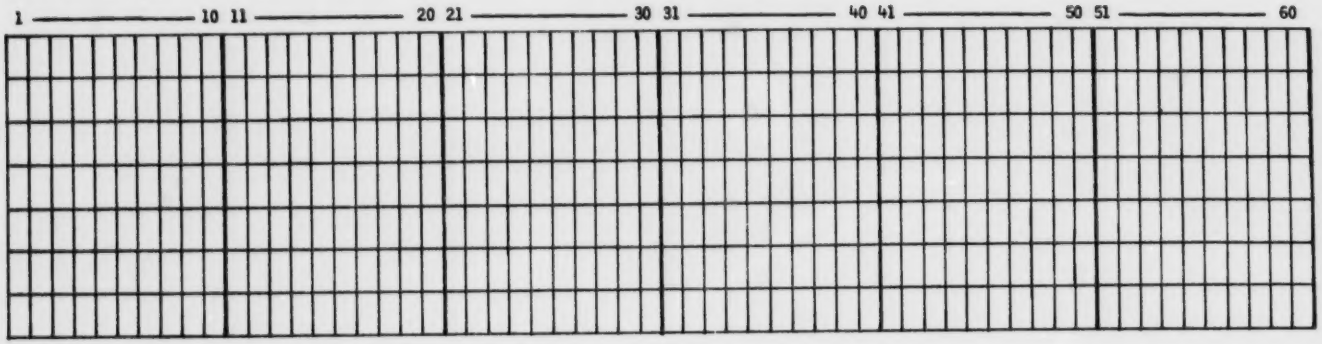
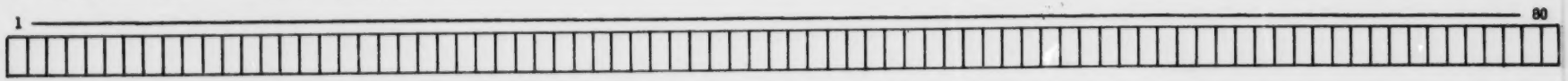
CARD NO. 7

((AAPP(I,L),I=1,5),PP(L),L=1,IP1) FORMAT(6F10.5)



CARD NO. 8

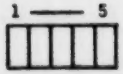
(FTN(I),I=1,8) FORMAT(8A10)



CARD NO. 9

NPROB FORMAT(I5)

1 —— 5



THE FOLLOWING CARDS ARE REPEATED FOR EACH PROBLEM

CARD NO. 10

NMS MP FORMAT(2I5)

1 —— 5 6 —— 10

** POLYGON OPTIONS**

CARD NO. 11

NPOLYG NSOM FORMAT(A10,I5)

1 ———— 10 11 —— 15

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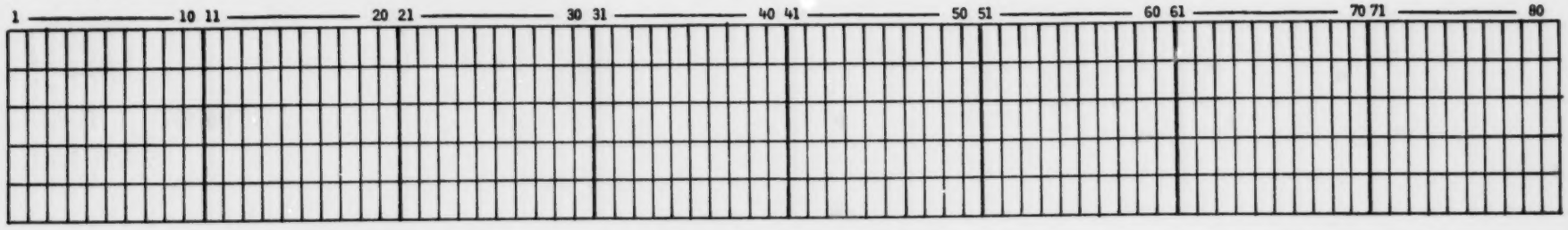
** POLYGON OPTIONS **

CARD NO. 12

ZINF ZSUP PMX PMY PMZ FORMAT(8F10.3)

CARD NO. 13

(XS(I),YS(I),I=1,NSOM) FORMAT(8F10.3)



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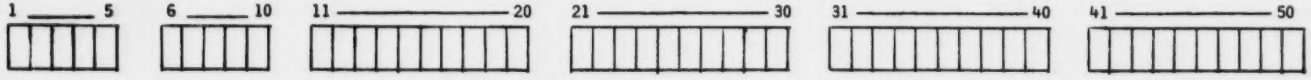
** POINTS AND BLOCKS OPTIONS **

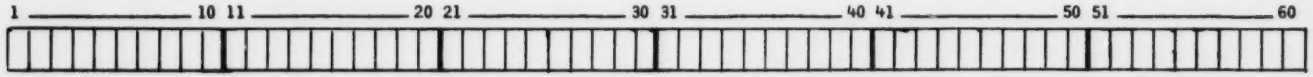
CARD NO. 11

NX NY XIX YIY ZIZ ECH FORMAT(2I5,4F10.3)



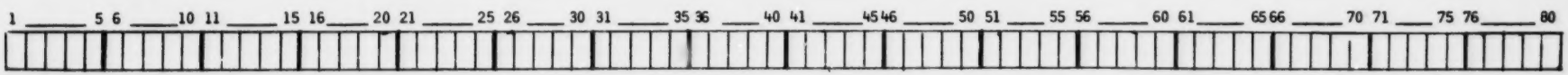
CARD NO. 12

XREF YREF ZREF PMX PMY PMZ FORMAT(8F10.3)



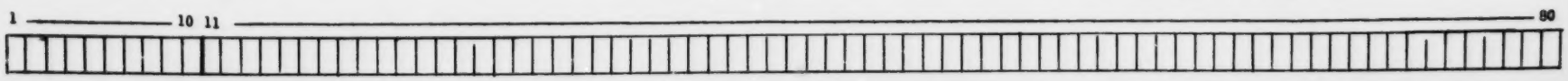
CARD NO. 13

NTYPE (IBL (I),I=1,NTYPE) FORMAT(16I5)



CARD NO. 14

IDA HTN FORMAT(I10,7A10)



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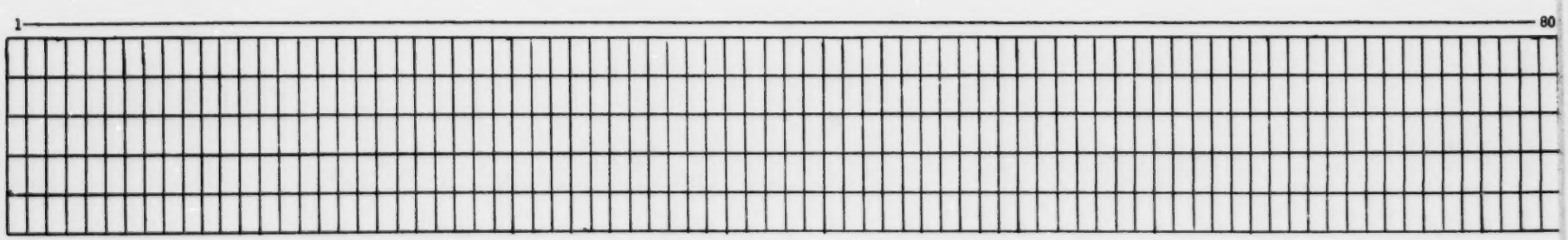
CARD NO. 15
(IBLOC(I,J), J=1, NX,I=1,NY) (FREE FORMAT)



EXECUTION

20

```
H2300, CM75000, IO500, T100, P2.
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2300,
PFNI=                    ,(PERMANENT FILE NAME OF MEG2010 OUTPUT FILE OR ANY OTHER FILE CREATED BY THE USER)
PFNO=                    ,(PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE (TAPE 6))
Q1=     ,Q2=     ,Q3=     ,Q4=     ,Q5=     ,Q6=     ,Q7=     ,Q8=     ,Q9=     ,Q10=     .
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

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CARD NO. 1

IDE	IOT	IOI	NPBX	NPBY	NPBZ	ICLUST	LOG	IEP	MPM
1 — 5	6 — 10	11 — 15	16 — 20	21 — 25	26 — 30	31 — 35	36 — 40	41 — 45	46 — 50
3	0	1	4	4	1	0	0	0	5

IPB	NTD	IP	ICH	IFREE
51 — 55	56 — 60	61 — 65	66 — 70	71 — 75
0	1	1	0	1

FORMAT(16I5)

CARD NO. 2

TMOY	VARI	ALFA	VARPB	AO	AA	AMIN	AMAX	ASTER
1 — 10	11 — 20	21 — 25	26 — 30	31 — 40	41 — 50	51 — 60	61 — 70	71 — 80
0.0	10.4878	0.0	0.0	0.0	1.0	30.0	50.0	30.0

FORMAT(8F10.3)

CARD NO. 3

(TEXT(I),I=1,8) FORMAT(8A10)

1 — 80

- BLOCK KRIGING - NINE BLOCKS USING SAMPLES GIVEN BY A. JOURNEL, A.216

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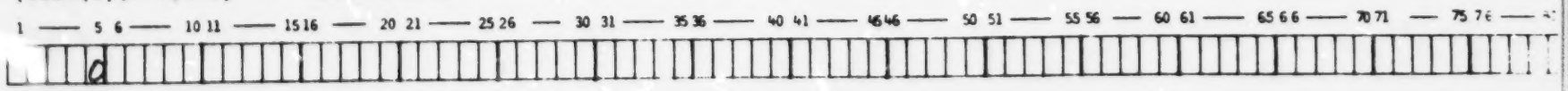
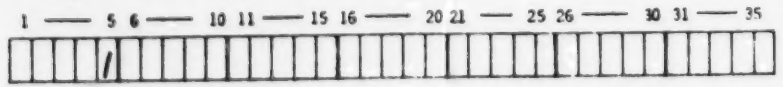
CARD NO. 4

(IDER(I),I=1,NTD) FORMAT(16I5)



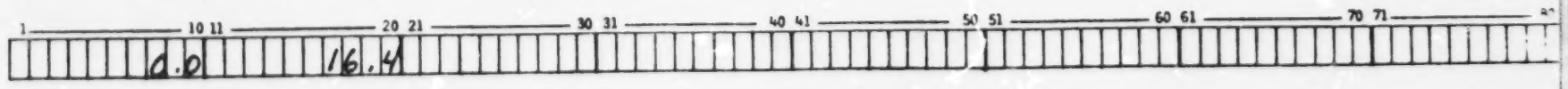
CARD NO. 5

(IVAR(I),I=1,IP) FORMAT(16I5)



CARD NO. 6

CO (CC(I),I=1,IP) FORMAT(8F10.3)



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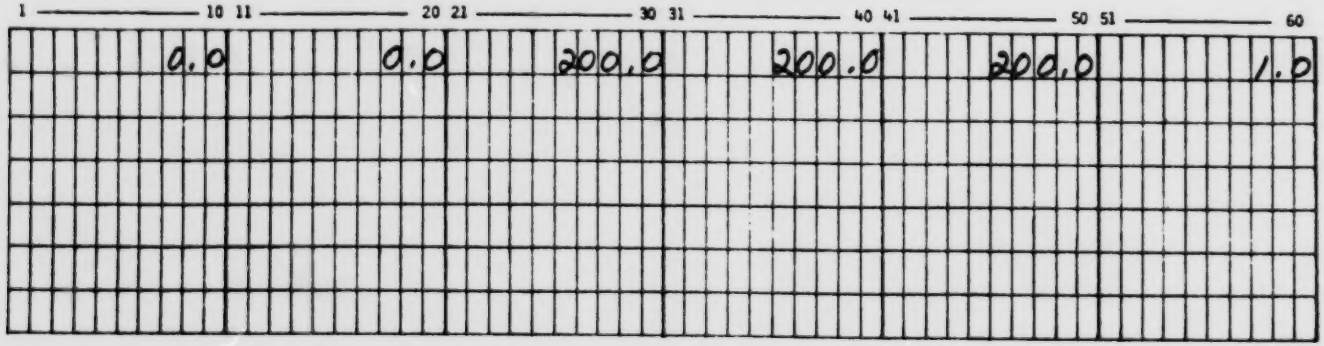
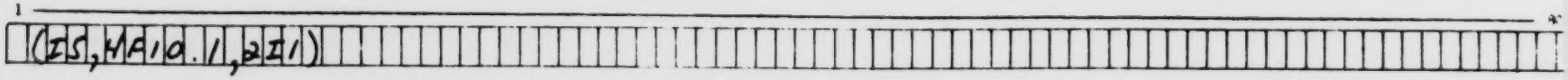
CARD NO. 7

((AAPP(I,L),I=1,5),PP(L),L=1,IP1) FORMAT(6F10.5)



CARD NO. 8

(FTN(I),I=1,8) FORMAT(8A10)



MEG2300 - OPTION CARDS

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CARD NO. 9

NPROB FORMAT(I5)

1 —— 5

				1

THE FOLLOWING CARDS ARE REPEATED FOR EACH PROBLEM

CARD NO. 10

NMS MP FORMAT(2I5)

1 —— 5 6 —— 10

			2				1		

** POLYGON OPTIONS**

CARD NO. 11 (NOT USED)

NPOLYG NSOM FORMAT(A10,I5)

1 ———— 10 11 —— 15

MEG2300 - OPTION CARDS

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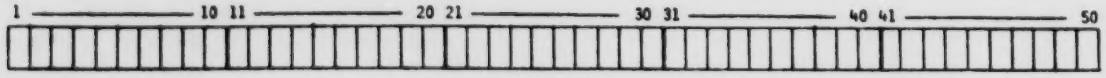
** POLYGON OPTIONS **

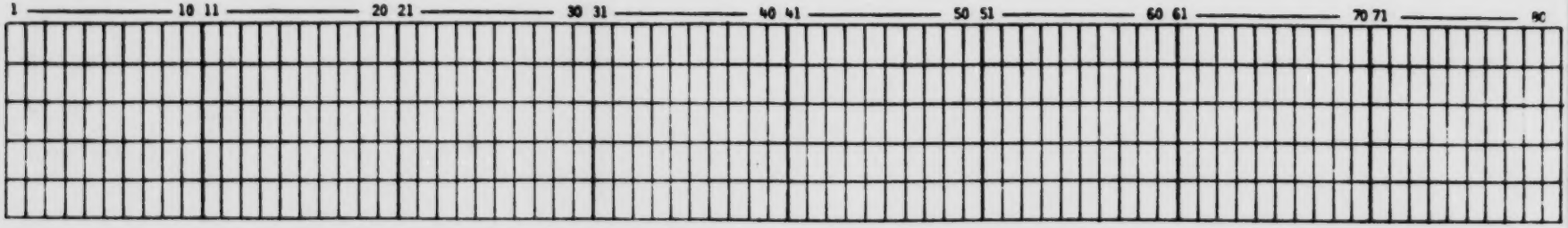
CARD NO. 12 (NOT USED)

ZINF ZSUP PMX PMY PMZ FORMAT(8F10.3)



CARD NO. 13 (NOT USED)

(XS(I),YS(I),I=1,NSOM) FORMAT(8F10.3)



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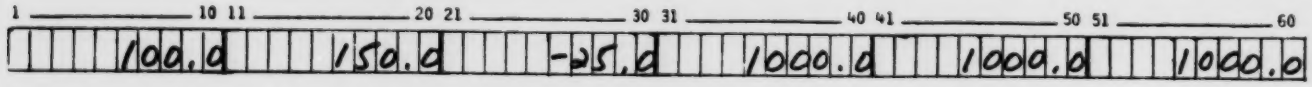
** POINTS AND BLOCKS OPTIONS **

CARD NO. 11

NX NY XIX YIY ZIZ ECH FORMAT(2I5,4F10.3)

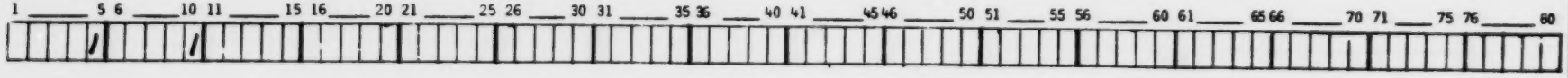
CARD NO. 12

XREF YREF ZREF PMX PMY PMZ FORMAT(8F10.3)



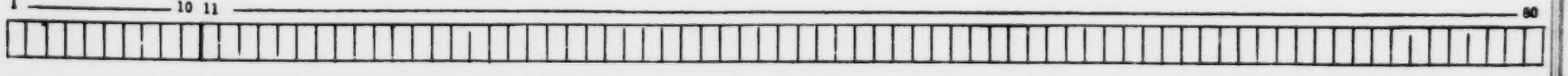
CARD NO. 13

NTYPE (IBL (I),I=1,NTYPE) FORMAT(16I5)



CARD NO. 14 (NOT USED)

IDA HTN FORMAT(I10,7A10)



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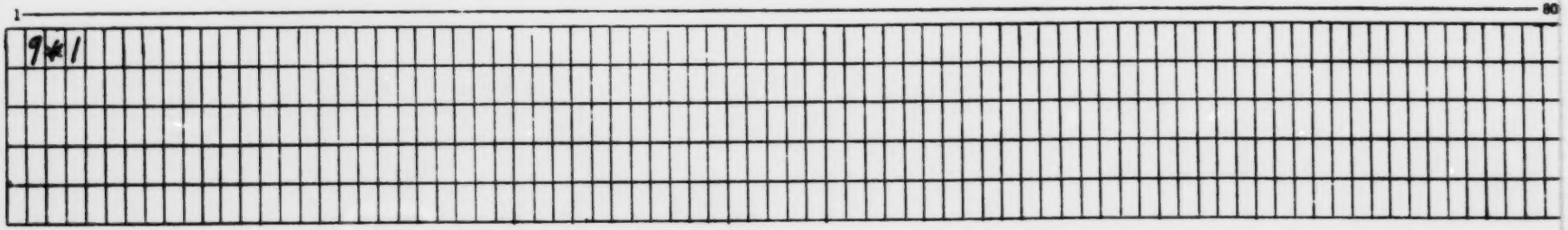
CARD NO. 15
(IBLOC(I,J), J=1, NX,I=1,NY) (FREE FORMAT)



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EXECUTION

H2300, CM75000, I0500, T100, P2.
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2300,
PFNI=MEG2200DATATEST,(PERMANENT FILE NAME OF MEG2010 OUTPUT FILE OR ANY OTHER FILE CREATED BY THE USER)
PFNO=MEG2300DATATEST,(PERMANENT FILE NAME OF MEG2300 OUTPUT DATA FILE (TAPE 6))
Q1= 3 ,Q2= 3 ,Q3= 18 ,Q4= 17 ,Q5= 1 ,Q6= 16 ,Q7= 16 ,Q8= 4 ,Q9= 10 ,Q10= 17 .

```
      PROGRAM GEM2300(INPUT,OUTPUT,TAPE1=INPUT,TAPE2=OUTPUT,TAPE3,TAPE4,
     -                TAPE5,TAPE6,TAPE7,TAPE8,TAPE9,TAPE10,TAPE11,
     -                TAPE12)
      REAL ZBLOC(3,3),VBLOC(3,3),A(171),B(18),
     -     BB(18),X(17),Z(17),V(17),AUX(18),XXB(16),
     -     YYB(16),ZZB(16),XPB(16),YPB(16),ZPB(16),
     -XS(4),YS(4),Y(17),VEC(10),ELL(17)
      INTEGER IBLOC(3,3),IDER(1),N(17),MOUS(17)
C*     NUMBER OF BLOCKS ON Y-AXIS; IF POLYGONS ARE EVALUATED THEN K1=1
      K1=3
C*     NUMBER OF BLOCKS ON X-AXIS; IF POLYGONS ARE EVALUATED THEN K2=1
      K2=3
C*     NUMBER OF SAMPLES TO ESTIMATE  A BLOCK INCREASED BY ONE
      K4=17
C*     NUMBER OF DRIFT COEFFICIENTS
      K5=1
C*     DIMENSION OF KRIGING MATRIX
      K3=17+1
C*     NUMBER OF INTEGRATION POINTS WITHIN A BLOCK
C*     K6= (NPRX*NPBY*NPBZ). K6=1 FOR POINTS OR POLYGONS
      K6=16
C*     NUMBER OF INTEGRATION POINTS WITHIN A BLOCK OR A POLYGON
C*     K7= (NPRX*NPBY*NPBZ). K7=1 FOR POINTS
      K7=16
C*     NUMBER OF POLYGON SUMMITS
      K8=4
      K9=4*2+2
      K10=(18*(18+1))/2
      CALL MEG2300(IBLOC,ZBLOC,VBLOC,A,B,BB,X,Y,Z,V,MOUS,IDER,
     -             AUX,N,XXB,YYB,ZZB,XPB,YPB,ZPB,XS,YS,VEC,ELL,K1,K2,
     -             K3,K4,K5,K6,K7,K8,K9,K10)
      STOP
      END
```

SECTION 1 - OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	IDE=	3	UNIT NUMBER OF INPUT DATA FILE:
	IOT=	0	IF IOT=1, ALL AVAILABLE SAMPLES ARE USED FOR EVALUATION: IF IOT=0, THE NUMBER OF SAMPLES USED IN EVALUATION IS NO LESS THAN MPH AND NO MORE THAN K4-1:
	IOI=	1	PRINTING OPTION: PRINTING OF SAMPLE INFORMATION OCCURS WHEN IOI=1:
	NPBX= NPBY= NPBZ=	4 4 1	EACH SIDE OF A BLOCK IS SUBDIVIDED BY NPBX, NPBY AND NPBZ RESPECTIVELY: WHEN POLYGONS ARE ANALYZED, THE SMALLEST BLOCK CONTAINING EACH POLYGON WILL BE USED:
	ICLUST=	0	OPTION CAUSING EVALUATION OF BLOCKS BY CLUSTER KRIGING (ICLUST=1):
	LOG=	0	LOGNORMAL KRIGING OPTION, USED WHEN LOG=1:
	IEP=	0	PROPORTIONAL EFFECT OPTION, WHEN IEP=1, A0 AND AA MUST BE SPECIFIED IF A RELATIVE VARIOGRAM IS USED:
	MPH=	5	SMALLEST NUMBER OF SAMPLES FOR AN EVALUATION (USED WHEN IOT=0):
	IPB=	0	NUMBER OF BLOCKS TAKING PART IN PERIPHERAL EVALUATION (BY COUNTING IN FROM THE EDGE OF GRID):
	NTO=	1	NUMBER OF DRIFT COEFFICIENTS:
	IP=	1	NUMBER OF VARIOGRAM MODELS:
	ICH=	0	IF ICH=0 OR BLANK (DEFAULT), VB(I,J) REPRESENTS V2SD (I.E. TWICE THE STANDARD DEVIATION OF THE KRIGING ESTIMATE) IF ICH=1, VB(I,J) REPRESENTS TWICE THE RELATIVE PRECISION OF THE KRIGING ESTIMATE: THIS OPTION DOES NOT APPLY FOR A LOGNORMAL ESTIMATION
	IFREE=	1	IF IFREE=1, OPTION IRLOC(CARD 15) MUST BE READ IN FREE FORMAT IF IFREE=0, OPTION IRLOC MUST BE READ IN CODED FORMAT:
2	THOY=	0.00000	ARITHMETIC MEAN OF THE STUDIED VARIABLE FOR THE DEPOSIT:
	VARI=	10.48780	VARIANCE OF STUDIED VARIABLE (IF LOG.GT.0, THIS IS A LOGNORMAL VARIANCE):
	ALFA=	0.0000	HORIZONTAL ANGLE OF ROTATION FROM X-AXIS OF THE GRID OF POINTS OR BLOCKS.
	VAHPR=	0.00000	VARIANCE OF A UNIT BLOCK WITHIN THE DEPOSIT (IF LOG.GT.0, THIS IS A LOGNORMAL VARIANCE):

```
      AA=          1.00000                    COEFFICIENTS TO DETERMINE THE LOCAL VARIANCE (THE FORMULA IS
                                              A0 + AA * M(EXP2)) WHEN A RELATIVE VARIOGRAM IS USED;

      AMIN=       30.00000
      AMAX=       50.00000                    RANGE OF ACCEPTABLE VARIABLE VALUES (LIMITS ARE RETAINED);

      ASTER=       30.0000                    SMALLEST ACCEPTABLE STERILE VALUE (FOR PERIPHERAL BLOCKS);

3     TEXT=     - BLOCK KRIGING - NINE BLOCKS USING SAMPLES GIVE BY A.JOURNEL, P.216
                                              TITLE OF EXECUTION;

4
      IDER( 1)=          0                    ARRAY OF DRIFT COEFFICIENTS INDICATORS;

5
      IVAR( 1)=          1                    ARRAY OF THEORETICAL VARIOGRAM MODELS INDICATORS;

6     C0=          0.000000                   NUGGET EFFECT VALUE;

      CC( 1)=       16.4000                   ARRAY CONTAINING SILL VALUES FOR EACH VARIOGRAM MODEL;

7     AAPP(1,1)=       0.000
      AAPP(2,1)=       0.000
      AAPP(3,1)=     200.000
      AAPP(4,1)=     200.000
      AAPP(5,1)=     200.000

      PP(1)=        1.00000
                                              RANGE SPECIFICATIONS FOR THEORETICAL VARIOGRAM MODELS;

8     FTN=       (I5,4F10.1,2I1)
                                              FORMAT OF INPUT DATA;

9     NPROB=             1                    NUMBER OF PROBLEMS STUDIED;
```

SECTION 1 - OPTIONS APPLIED: PROBLEM NO. 1

CARD	OPTION		DESCRIPTION
10	NMS=	2	EVALUATION OPTION:
	MP=	41	MAXIMUM NUMBER OF SAMPLES TO BE READ FROM INPUT DATA FILE:
11	NX=	3	
	NY=	3	NUMBER OF POINTS OR BLOCKS ALONG BOTH GRID AXIS:
	XIX=	50.00000	
	YIY=	50.00000	
	ZIZ=	50.00000	COORDINATE SEPARATIONS WHEN POINTS ARE USED: IF BLOCKS ARE USED, THESE VALUES REPRESENT DIMENSIONS OF BLOCKS:
	ECM=	1.0000	SCALING FACTOR FOR PRINTING OF BLOCKS OR POINTS:
12	XREF=	100.0000	
	YREF=	150.0000	
	ZREF=	-25.0000	COORDINATES OF REFERENCE POINT FOR THE GRID OF POINTS OR OF BLOCKS:
	PMX=	1000.00000	
	PMY=	1000.00000	
	PMZ=	1000.00000	RESPECTIVE WIDTHS OF PERIPHERAL ZONE ALONG EACH SIDE OF GRID:
13	NTYPE=	1	NUMBER OF DIFFERENT TYPES OF BLOCKS TO BE EVALUATED:
	IBL=	1	INDICATORS FOR THE ACCEPTED BLOCKS:

CARD	OPTION	DESCRIPTION
15	IBLOC(3, 3) 1 1 1 1 1 1 1 1 1	ARRAY CONTAINING BLANKING INDICATORS:

SECTION 2 - COMPUTATION OF THE VARIANCE OF A BLOCK, POINT OR POLYGON IN THE DEPOSIT

XYMX= 12.50 XYMY= 12.50 XYMZ= 50.00

NPB= 16 NUMBER OF POINTS USED TO INTEGRATE A BLOCK!

VARPB= 8.0090 VARIANCE OF A BLOCK (POINT) IN DEPOSIT!

RELATIVE COORDINATES OF INTEGRATED POINTS IN A BLOCK!

XXB(1)=	6.2500	YYB(1)=	6.2500	ZZB(1)=	0.0000
XXB(2)=	18.7500	YYB(2)=	6.2500	ZZB(2)=	0.0000
XXB(3)=	31.2500	YYB(3)=	6.2500	ZZB(3)=	0.0000
XXB(4)=	43.7500	YYB(4)=	6.2500	ZZB(4)=	0.0000
XXB(5)=	6.2500	YYB(5)=	18.7500	ZZB(5)=	0.0000
XXB(6)=	18.7500	YYB(6)=	18.7500	ZZB(6)=	0.0000
XXB(7)=	31.2500	YYB(7)=	18.7500	ZZB(7)=	0.0000
XXB(8)=	43.7500	YYB(8)=	18.7500	ZZB(8)=	0.0000
XXB(9)=	6.2500	YYB(9)=	31.2500	ZZB(9)=	0.0000
XXB(10)=	18.7500	YYB(10)=	31.2500	ZZB(10)=	0.0000
XXB(11)=	31.2500	YYB(11)=	31.2500	ZZB(11)=	0.0000
XXB(12)=	43.7500	YYB(12)=	31.2500	ZZB(12)=	0.0000
XXB(13)=	6.2500	YYB(13)=	43.7500	ZZB(13)=	0.0000
XXB(14)=	18.7500	YYB(14)=	43.7500	ZZB(14)=	0.0000
XXB(15)=	31.2500	YYB(15)=	43.7500	ZZB(15)=	0.0000
XXB(16)=	43.7500	YYB(16)=	43.7500	ZZB(16)=	0.0000

SECTION 3 - LIST OF INPUT DATA

SAMPLE NUMBER	COORDINATES			VARIABLE VALUES	NUMBER OF SAMPLES IN BLOCK (NOT USED WHEN ICLUST=0)!
1	0.000	350.000	0.000	35.000	0
2	50.000	350.000	0.000	35.000	0
3	100.000	350.000	0.000	33.000	0
4	150.000	350.000	0.000	33.000	0
5	200.000	350.000	0.000	34.000	0
6	250.000	350.000	0.000	31.000	0
7	300.000	350.000	0.000	35.000	0
8	350.000	350.000	0.000	37.000	0
9	400.000	350.000	0.000	41.000	0
10	450.000	350.000	0.000	41.000	0
11	0.000	300.000	0.000	35.000	0
12	50.000	300.000	0.000	35.000	0
13	100.000	300.000	0.000	35.000	0
14	250.000	300.000	0.000	35.000	0
15	300.000	300.000	0.000	33.000	0
16	450.000	300.000	0.000	41.000	0
17	0.000	250.000	0.000	37.000	0
18	50.000	250.000	0.000	35.000	0
19	100.000	250.000	0.000	37.000	0
20	150.000	250.000	0.000	35.000	0
21	250.000	250.000	0.000	37.000	0
22	300.000	250.000	0.000	37.000	0
23	350.000	250.000	0.000	39.000	0
24	400.000	250.000	0.000	39.000	0
25	450.000	250.000	0.000	41.000	0
26	0.000	200.000	0.000	37.000	0
27	50.000	200.000	0.000	40.000	0
28	100.000	200.000	0.000	42.000	0
29	200.000	200.000	0.000	34.000	0
30	250.000	200.000	0.000	36.000	0
31	300.000	200.000	0.000	41.000	0
32	450.000	200.000	0.000	34.000	0
33	0.000	150.000	0.000	37.000	0
34	100.000	150.000	0.000	41.000	0
35	250.000	150.000	0.000	33.000	0
36	150.000	100.000	0.000	35.000	0
37	350.000	100.000	0.000	42.000	0
38	400.000	100.000	0.000	33.000	0
39	350.000	50.000	0.000	39.000	0
40	450.000	50.000	0.000	31.000	0
41	250.000	0.000	0.000	30.000	0

THE NUMBER OF SAMPLES IN THE SELECTED ZONE IS = 41

THE HARMONIC MEAN OF THE NUMBER OF SAMPLES IN BLOCKS IS= 0.0000
(CALCULATED IF ICLUST.GT.0)

SECTION 4 - DETAILED KRIGING RESULTS

ZK - KRIGING ESTIMATOR;
VARK - KRIGING VARIANCE;
VZSO - TWICE THE KRIGING STANDARD DEVIATION;
I,J - INDICES OF THE KRIGED POINT OR BLOCK AS SPECIFIED IN IBLOC MATRIX;
I=1,J=1 CORRESPONDS TO THE UPPER LEFT CORNER OF IBLOC;
ZKI - LOWER LIMIT OF A 95 PER CENT CONFIDENCE INTERVAL;
ZKS - UPPER LIMIT OF A 95 PER CENT CONFIDENCE INTERVAL;
NP - NUMBER OF SAMPLES USED TO OBTAIN THE KRIGING ESTIMATOR;
SURFA - SURFACE AREA OF BLOCK OR POLYGON;
VOLUME - VOLUME OF BLOCK OR POLYGON;
XB,YB,ZB - MIDPOINT COORDINATES OF THE EVALUATED BLOCK, POLYGON OR POINT;
NRAG(K) - SAMPLE NUMBER (K=1,NP);
B(K) - KRIGING WEIGHT FOR SAMPLE K (K=1,NP);
V(K) - VARIABLE VALUE FOR SAMPLE K (K=1,NP);
BB(K) - COVARIANCE BETWEEN SAMPLE K AND THE KRIGED POINT OR BLOCK (K=i,NP);
BKI - KRIGING WEIGHT GIVEN TO THE ARITHMETIC MEAN OF DEPOSIT;
TMOY - ARITHMETIC MEAN OF DEPOSIT (SPECIFIED BY USER);
B(K),BB(K) - LAGRANGE MULTIPLIER AND VALUE OF POLYNOMIAL DRIFT TERM (K=NP+1,NP+NTD);

- BLOCK KRIGING - NINE BLOCKS USING SAMPLES GIVE BY A.JOURNEL, P.216

ZK=	35.27109	VARK=	.49168	V2SD=	1.40240					I= 1	J= 1
ZKI=	33.86869	ZKS=	36.67348								
NP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	125.00000	YB=	275.00000	ZB=	0.00000						
URAG(1)=	13	B(1)=	.3419	V(1)=	35.0000	BB(1)=	13.2805				
URAG(2)=	20	B(2)=	.3492	V(2)=	35.0000	BB(2)=	13.2805				
URAG(3)=	19	B(3)=	.2789	V(3)=	37.0000	BB(3)=	13.2805				
URAG(4)=	3	B(4)=	.0019	V(4)=	33.0000	BB(4)=	9.8151				
URAG(5)=	12	B(5)=	-.0034	V(5)=	35.0000	BB(5)=	9.8151				
URAG(6)=	4	B(6)=	.0648	V(6)=	33.0000	BB(6)=	9.8151				
URAG(7)=	28	B(7)=	-.0011	V(7)=	42.0000	BB(7)=	9.8151				
URAG(8)=	18	B(8)=	-.0014	V(8)=	35.0000	BB(8)=	9.8151				
URAG(9)=	2	B(9)=	-.0142	V(9)=	35.0000	BB(9)=	7.6274				
URAG(10)=	29	B(10)=	-.0095	V(10)=	34.0000	BB(10)=	7.6274				
URAG(11)=	5	B(11)=	.0159	V(11)=	34.0000	BB(11)=	7.6274				
URAG(12)=	27	B(12)=	-.0111	V(12)=	40.0000	BB(12)=	7.6274				
URAG(13)=	11	B(13)=	-.0133	V(13)=	35.0000	BB(13)=	5.8838				
URAG(14)=	21	B(14)=	.0060	V(14)=	37.0000	BB(14)=	5.8838				
URAG(15)=	34	B(15)=	-.0160	V(15)=	41.0000	BB(15)=	5.8838				
URAG(16)=	14	B(16)=	.0114	V(16)=	35.0000	BB(16)=	5.8838				
		B(17)=	.1650			BB(17)=	1.0000				
ZK=	34.67246	VARK=	1.38397	V2SD=	2.35284					I= 1	J= 2
ZKI=	32.31961	ZKS=	37.02530								
NP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	175.00000	YB=	275.00000	ZB=	0.00000						
URAG(1)=	20	B(1)=	.5142	V(1)=	35.0000	BB(1)=	13.2805				
URAG(2)=	4	B(2)=	.0995	V(2)=	33.0000	BB(2)=	9.8151				
URAG(3)=	29	B(3)=	.0706	V(3)=	34.0000	BB(3)=	9.8151				
URAG(4)=	13	B(4)=	.0810	V(4)=	35.0000	BB(4)=	9.8151				
URAG(5)=	21	B(5)=	.1288	V(5)=	37.0000	BB(5)=	9.8151				
URAG(6)=	5	B(6)=	.1153	V(6)=	34.0000	BB(6)=	9.8151				
URAG(7)=	14	B(7)=	.1334	V(7)=	35.0000	BB(7)=	9.8151				
URAG(8)=	19	B(8)=	-.0130	V(8)=	37.0000	BB(8)=	9.8151				
URAG(9)=	3	B(9)=	-.0116	V(9)=	33.0000	BB(9)=	7.6274				
URAG(10)=	30	B(10)=	-.0080	V(10)=	36.0000	BB(10)=	7.6274				
URAG(11)=	6	B(11)=	-.0201	V(11)=	31.0000	BB(11)=	7.6274				
URAG(12)=	28	B(12)=	-.0326	V(12)=	42.0000	BB(12)=	7.6274				
URAG(13)=	12	B(13)=	-.0100	V(13)=	35.0000	BB(13)=	5.8838				
URAG(14)=	22	B(14)=	-.0359	V(14)=	37.0000	BB(14)=	5.8838				
URAG(15)=	15	B(15)=	-.0150	V(15)=	33.0000	BB(15)=	5.8838				
URAG(16)=	18	B(16)=	.0035	V(16)=	35.0000	BB(16)=	5.8838				
		B(17)=	.5565			BB(17)=	1.0000				
ZK=	35.50951	VARK=	.90301	V2SD=	1.90854					I= 1	J= 3
ZKI=	33.60897	ZKS=	37.41005								
NP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	225.00000	YB=	275.00000	ZB=	0.00000						
URAG(1)=	21	B(1)=	.3844	V(1)=	37.0000	BB(1)=	13.2805				
URAG(2)=	14	B(2)=	.3892	V(2)=	35.0000	BB(2)=	13.2805				
URAG(3)=	5	B(3)=	.0802	V(3)=	34.0000	BB(3)=	9.8151				
URAG(4)=	30	B(4)=	.0229	V(4)=	36.0000	BB(4)=	9.8151				
URAG(5)=	22	B(5)=	-.0142	V(5)=	37.0000	BB(5)=	9.8151				
URAG(6)=	6	B(6)=	-.0072	V(6)=	31.0000	BB(6)=	9.8151				
URAG(7)=	29	B(7)=	.0792	V(7)=	34.0000	BB(7)=	9.8151				

URAG(10)=	4	B(10)=	.0290	V(10)=	33.0000	AB(10)=	7.6274				
URAG(11)=	31	B(11)=	-.0160	V(11)=	41.0000	AB(11)=	7.6274				
URAG(12)=	7	B(12)=	-.0158	V(12)=	35.0000	AB(12)=	7.6274				
URAG(13)=	35	B(13)=	-.0339	V(13)=	33.0000	AB(13)=	5.8838				
URAG(14)=	13	B(14)=	.0107	V(14)=	35.0000	AB(14)=	5.8838				
URAG(15)=	23	B(15)=	-.0075	V(15)=	39.0000	AB(15)=	5.8838				
URAG(16)=	19	B(16)=	-.0209	V(16)=	37.0000	AB(16)=	5.8838				
		B(17)=	.3138			AB(17)=	1.0000				
ZK=	37.88417	VARK=	.49134	V2SD=	1.40191			I= 2	J= 1		
ZKI=	36.48226	ZKS=	39.28607								
MP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	125.00000	YB=	225.00000	ZB=	0.00000						
URAG(1)=	19	B(1)=	.2804	V(1)=	37.0000	AB(1)=	13.2805				
URAG(2)=	20	B(2)=	.3394	V(2)=	35.0000	AB(2)=	13.2805				
URAG(3)=	28	B(3)=	.3460	V(3)=	42.0000	AB(3)=	13.2805				
URAG(4)=	13	B(4)=	-.0019	V(4)=	35.0000	AB(4)=	9.8151				
URAG(5)=	18	B(5)=	-.0037	V(5)=	35.0000	AB(5)=	9.8151				
URAG(6)=	29	B(6)=	.0813	V(6)=	34.0000	AB(6)=	9.8151				
URAG(7)=	34	B(7)=	.0134	V(7)=	41.0000	AB(7)=	9.8151				
URAG(8)=	27	B(8)=	-.0233	V(8)=	40.0000	AB(8)=	9.8151				
URAG(9)=	12	B(9)=	-.0075	V(9)=	35.0000	AB(9)=	7.6274				
URAG(10)=	3	B(10)=	-.0071	V(10)=	33.0000	AB(10)=	5.8838				
URAG(11)=	36	B(11)=	.0182	V(11)=	35.0000	AB(11)=	5.8838				
URAG(12)=	17	B(12)=	-.0085	V(12)=	37.0000	AB(12)=	5.8838				
URAG(13)=	30	B(13)=	-.0078	V(13)=	36.0000	AB(13)=	5.8838				
URAG(14)=	4	B(14)=	-.0168	V(14)=	33.0000	AB(14)=	5.8838				
URAG(15)=	21	B(15)=	-.0068	V(15)=	37.0000	AB(15)=	5.8838				
URAG(16)=	26	B(16)=	.0046	V(16)=	37.0000	AB(16)=	5.8838				
		B(17)=	.1561			AB(17)=	1.0000				
ZK=	35.25898	VARK=	.75913	V2SD=	1.74256			I= 2	J= 2		
ZKI=	33.51642	ZKS=	37.00154								
MP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	175.00000	YB=	225.00000	ZB=	0.00000						
URAG(1)=	20	B(1)=	.4365	V(1)=	35.0000	AB(1)=	13.2805				
URAG(2)=	29	B(2)=	.4347	V(2)=	34.0000	AB(2)=	13.2805				
URAG(3)=	19	B(3)=	-.0084	V(3)=	37.0000	AB(3)=	9.8151				
URAG(4)=	30	B(4)=	.0029	V(4)=	36.0000	AB(4)=	9.8151				
URAG(5)=	21	B(5)=	.0822	V(5)=	37.0000	AB(5)=	9.8151				
URAG(6)=	28	B(6)=	.0641	V(6)=	42.0000	AB(6)=	9.8151				
URAG(7)=	13	B(7)=	-.0157	V(7)=	35.0000	AB(7)=	7.6274				
URAG(8)=	35	B(8)=	-.0123	V(8)=	33.0000	AB(8)=	7.6274				
URAG(9)=	14	B(9)=	.0231	V(9)=	35.0000	AB(9)=	7.6274				
URAG(10)=	34	B(10)=	.0200	V(10)=	41.0000	AB(10)=	7.6274				
URAG(11)=	4	B(11)=	.0029	V(11)=	33.0000	AB(11)=	5.8838				
URAG(12)=	18	B(12)=	-.0015	V(12)=	35.0000	AB(12)=	5.8838				
URAG(13)=	31	B(13)=	.0008	V(13)=	41.0000	AB(13)=	5.8838				
URAG(14)=	9	B(14)=	.0007	V(14)=	34.0000	AB(14)=	5.8838				
URAG(15)=	36	B(15)=	-.0009	V(15)=	35.0000	AB(15)=	5.8838				
URAG(16)=	22	B(16)=	-.0313	V(16)=	37.0000	AB(16)=	5.8838				
		B(17)=	.2464			AB(17)=	1.0000				
ZK=	35.52376	VARK=	.49354	V2SD=	1.40505			I= 2	J= 3		
ZKI=	34.11871	ZKS=	36.92880								
MP=	16	SURFA=	2500.00000	VOLUME=	125000.00000						
XB=	225.00000	YB=	225.00000	ZB=	0.00000						
URAG(1)=	30	B(1)=	.2840	V(1)=	36.0000	AB(1)=	13.2805				
URAG(2)=	21	B(2)=	.3479	V(2)=	37.0000	AB(2)=	13.2805				
URAG(3)=	29	B(3)=	.3360	V(3)=	34.0000	AB(3)=	13.2805				
URAG(4)=	35	B(4)=	-.0282	V(4)=	33.0000	AB(4)=	9.8151				

URAG(7)=	14	B(7)=	.0315	V(7)=	35.0000	AB(7)=	9.8151		
URAG(8)=	22	B(8)=	-.0162	V(8)=	37.0000	AB(8)=	9.8151		
URAG(9)=	15	B(9)=	-.0141	V(9)=	33.0000	AB(9)=	7.6274		
URAG(10)=	5	B(10)=	.0077	V(10)=	34.0000	AB(10)=	5.8838		
URAG(11)=	19	B(11)=	-.0166	V(11)=	37.0000	AB(11)=	5.8838		
URAG(12)=	6	B(12)=	-.0087	V(12)=	31.0000	AB(12)=	5.8838		
URAG(13)=	23	B(13)=	.0050	V(13)=	39.0000	AB(13)=	5.8838		
URAG(14)=	28	B(14)=	-.0099	V(14)=	42.0000	AB(14)=	5.8838		
URAG(15)=	4	B(15)=	.0091	V(15)=	33.0000	AB(15)=	4.3916		
URAG(16)=	13	B(16)=	.0024	V(16)=	35.0000	AB(16)=	4.3916		
		B(17)=	.2007			AB(17)=	1.0000		
ZK=	39.59808	VARK=	.89323	V2SD=	1.89021				
ZKI=	37.70787	ZKS=	41.48830						
HP=	16	SURFA=	2500.00000	VOLUME=	125000.00000				
XB=	125.00000	YB=	175.00000	ZB=	0.00000			I= 3	J= 1
URAG(1)=	28	B(1)=	.3820	V(1)=	42.0000	AB(1)=	13.2805		
URAG(2)=	34	B(2)=	.3723	V(2)=	41.0000	AB(2)=	13.2805		
URAG(3)=	19	B(3)=	.0224	V(3)=	37.0000	AB(3)=	9.8151		
URAG(4)=	36	B(4)=	.0911	V(4)=	35.0000	AB(4)=	9.8151		
URAG(5)=	27	B(5)=	-.0099	V(5)=	40.0000	AB(5)=	9.8151		
URAG(6)=	20	B(6)=	.0729	V(6)=	35.0000	AB(6)=	9.8151		
URAG(7)=	29	B(7)=	.1186	V(7)=	34.0000	AB(7)=	9.8151		
URAG(8)=	18	B(8)=	.0165	V(8)=	35.0000	AB(8)=	7.6274		
URAG(9)=	13	B(9)=	-.0046	V(9)=	35.0000	AB(9)=	5.8838		
URAG(10)=	26	B(10)=	.0166	V(10)=	37.0000	AB(10)=	5.8838		
URAG(11)=	35	B(11)=	.0364	V(11)=	33.0000	AB(11)=	5.8838		
URAG(12)=	30	B(12)=	-.0061	V(12)=	36.0000	AB(12)=	5.8838		
URAG(13)=	33	B(13)=	-.0350	V(13)=	37.0000	AB(13)=	5.8838		
URAG(14)=	12	B(14)=	-.0380	V(14)=	35.0000	AB(14)=	4.3916		
URAG(15)=	17	B(15)=	-.0298	V(15)=	37.0000	AB(15)=	4.3916		
URAG(16)=	21	B(16)=	-.0055	V(16)=	37.0000	AB(16)=	4.3916		
		B(17)=	.2665			AB(17)=	1.0000		
ZK=	35.87760	VARK=	1.30422	V2SD=	2.28405				
ZKI=	33.59355	ZKS=	38.16164						
HP=	16	SURFA=	2500.00000	VOLUME=	125000.00000				
XB=	175.00000	YB=	175.00000	ZB=	0.00000			I= 3	J= 2
URAG(1)=	29	B(1)=	.4790	V(1)=	34.0000	AB(1)=	13.2805		
URAG(2)=	20	B(2)=	.0998	V(2)=	35.0000	AB(2)=	9.8151		
URAG(3)=	28	B(3)=	.1142	V(3)=	42.0000	AB(3)=	9.8151		
URAG(4)=	35	B(4)=	.1244	V(4)=	33.0000	AB(4)=	9.8151		
URAG(5)=	36	B(5)=	.1723	V(5)=	35.0000	AB(5)=	9.8151		
URAG(6)=	30	B(6)=	-.0129	V(6)=	36.0000	AB(6)=	9.8151		
URAG(7)=	34	B(7)=	.1008	V(7)=	41.0000	AB(7)=	9.8151		
URAG(8)=	19	B(8)=	.0428	V(8)=	37.0000	AB(8)=	7.6274		
URAG(9)=	21	B(9)=	.0147	V(9)=	37.0000	AB(9)=	7.6274		
URAG(10)=	27	B(10)=	-.0124	V(10)=	40.0000	AB(10)=	5.8838		
URAG(11)=	31	B(11)=	.0333	V(11)=	41.0000	AB(11)=	5.8838		
URAG(12)=	13	B(12)=	.0398	V(12)=	35.0000	AB(12)=	4.3916		
URAG(13)=	18	B(13)=	.0126	V(13)=	35.0000	AB(13)=	4.3916		
URAG(14)=	14	B(14)=	-.0676	V(14)=	35.0000	AB(14)=	4.3916		
URAG(15)=	22	B(15)=	-.0194	V(15)=	37.0000	AB(15)=	4.3916		
URAG(16)=	12	B(16)=	-.1212	V(16)=	35.0000	AB(16)=	1.8760		
		B(17)=	.1998			AB(17)=	1.0000		
ZK=	34.47786	VARK=	.48349	V2SD=	1.39067				
ZKI=	33.68719	ZKS=	35.86854						
HP=	16	SURFA=	2500.00000	VOLUME=	125000.00000				
XB=	225.00000	YB=	175.00000	ZB=	0.00000			I= 3	J= 3
URAG(1)=	29	B(1)=	.3449	V(1)=	34.0000	AB(1)=	13.2805		

URAG(4)=	21	B(4)=	.0047	V(4)=	37.0000	BB(4)=	9.8151
URAG(5)=	31	B(5)=	.0126	V(5)=	41.0000	BB(5)=	9.8151
URAG(6)=	20	B(6)=	-.0111	V(6)=	35.0000	BB(6)=	7.6274
URAG(7)=	22	B(7)=	.0168	V(7)=	37.0000	BB(7)=	7.6274
URAG(8)=	36	B(8)=	.0586	V(8)=	35.0000	BB(8)=	7.6274
URAG(9)=	28	B(9)=	.0070	V(9)=	42.0000	BB(9)=	5.8838
URAG(10)=	14	B(10)=	.0114	V(10)=	35.0000	BB(10)=	5.8838
URAG(11)=	34	B(11)=	.0151	V(11)=	41.0000	BB(11)=	5.8838
URAG(12)=	19	B(12)=	.0395	V(12)=	37.0000	BB(12)=	4.3916
URAG(13)=	37	B(13)=	-.0019	V(13)=	42.0000	BB(13)=	4.3916
URAG(14)=	15	B(14)=	-.0326	V(14)=	33.0000	BB(14)=	4.3916
URAG(15)=	23	B(15)=	-.0325	V(15)=	39.0000	BB(15)=	4.3916
URAG(16)=	13	B(16)=	-.0483	V(16)=	35.0000	BB(16)=	1.8760
		B(17)=	.0319			BB(17)=	1.0000

SECTION 5 - SCALED TABLES OF KRIGING RESULTS

SCALE USED IS 1.0

- BLOCK KRIGING - NINE BLOCKS USING SAMPLES GIVE BY A.JOURNEL, P.216

ZB= 0.0000 KRIGING ELEVATION:

	1 125.00	2 175.00	3 225.00	
1 275.00	35.27 1.40 16	34.67 2.35 16	35.51 1.90 16	1 275.00
2 225.00	37.88 1.40 16	35.26 1.74 16	35.52 1.41 16	2 225.00
3 175.00	39.60 1.89 16	35.88 2.28 16	34.48 1.39 16	3 175.00

1 125.00	2 175.00	3 225.00

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APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, EMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

ERP – MRL

82–112 TR

Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology / Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2400 USER'S GUIDE - GEM SYSTEM - CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin
Mine Evaluation Group

October 1982

This document is an unedited interim report prepared primarily for discussion and internal reporting purposes. It does not represent a final expression of the opinion of the Canada Centre for Mineral and Energy Technology (CANMET)

Ce document est un rapport [illegible] rédigé [illegible] de [illegible] mentation [illegible] définitive de [illegible] Centre canadien de la [illegible] des minéraux et de l'énergie (CANMET)

30pp

ENERGY RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT ERP/MRL 82-112(TR)

PROGRAM MEG2400 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2400 is to calculate three categories of recoverable reserves (measured, indicated and inferred) based on the metal and tonnage content of blocks or polygons evaluated by MEG2300 and based on technical criteria giving the degree of confidence of local reserve. MEG2400 will calculate the ore reserves as well as the waste. The program will firstly calculate the in-situ ore reserves and waste, secondly the diluted ore reserves and thirdly the recoverable ore reserves using the users' supplied mining parameters. Tables showing the different types of reserves are printed by the program.

The input files of MEG2400 must be provided by MEG2300.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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*Mining Geologist and Geostatistician, Mining Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa.

GUIDE D'USAGER POUR LE PROGRAMME MEG2400
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2400 est de calculer trois catégories de réserves récupérables (mesurées, indiquées et inférées) calculées à partir des quantités de métal et de tonnage de blocs réguliers ou de polygones déjà évaluées par MEG2300 et aussi à partir de critères techniques définissant les différents degrés de certitude quant à l'existence des réserves locales. MEG2400 calculera aussi bien le tonnage de la roche stérile que celui du minerai. Le programme calculera en premier lieu les réserves en place du minerai pour ensuite calculer les réserves diluées et enfin les réserves récupérables utilisant les paramètres miniers fournis par l'utilisateur. Des tableaux donnant les différentes catégories de réserves sont imprimés par le programme. Le fichier d'entrée de MEG2400 doit être fourni par MEG2300.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2400(IBLOC,AB,HB,URAG,HC,HD,AC,AD,K1,K2,K3)
C*                                                                      *
C*                                                                      *
C*********************************************************************
C*                                                                      *
C*                                                                      *
C*     TO CALCULATE TOTAL RESERVE ESTIMATES (MEASURED, INDICATED,      *
C*     INFERRED) BASED ON METAL AND TONNAGE VALUES OF BLOCKS OR        *
C*     POLYGONS AND ON THE RELATIVE PRECISION LIMITS ASSOCIATED WITH   *
C*     THESE VALUES;                                                   *
C*                                                                      *
C******GENERAL DESCRIPTION                                             *
C*                                                                      *
C*     THIS PROGRAM USUALLY READS TWO FILES WHICH CONTAIN THE METAL    *
C*     AND THE TONNAGE ESTIMATES (MEG2300) FOR BLOCKS OR POLYGONS.     *
C*     WHEN THE GRADE IS AVAILABLE AND THE DENSITY REMAINS CONSTANT,   *
C*     ONLY ONE FILE (GRADES) NEED BE USED.  IN THIS CASE, ONLY        *
C*     THOSE BLOCKS HAVING AN AVERAGE GRADE GREATER THAN THE CUT-OFF   *
C*     GRADE ARE USED IN CALCULATING ORE RESERVES, UNLESS THE          *
C*     LOGNORMAL STANDARD DEVIATION (STD) OF THE GRADE FOR A UNIT      *
C*     VOLUME INSIDE A BLOCK IS AVAILABLE.    WHEN THIS                *
C*     VALUE IS GIVEN THE PROGRAM WILL, FOR EACH BLOCK, COMPUTE THE    *
C*     PROPORTION OF METAL AND TONNAGE REPRESENTED BY ALL UNIT         *
C*     VOLUMES (CONTAINED WITHIN THE GIVEN BLOCK) HAVING               *
C*     GRADES THAT ARE GREATER THAN THE CUT-OFF GRADE.                 *
C*     A DILUTION FACTOR AND A DILUTION GRADE ARE USED TO CALCULATE    *
C*     THE DILUTED RESERVES, UNLESS TWO-DIMENSIONAL VARIABLES          *
C*     AND DILUTED ECONOMICAL INTERSECTIONS HAVE BEEN USED TO COMPUTE  *
C*     THE METAL AND TONNAGE PER UNIT AREA.                            *
C*     THE DILUTION FACTOR REPRESENTS THE PERCENTAGE OF IN-SITU ORE    *
C*     TONNAGE TO BE TAKEN AS DILUTION TONNAGE. THE DILUTION GRADE     *
C*     IS THE GRADE APPLIED TO THAT DILUTION TONNAGE.                  *
C*     THE RECOVERY FACTOR REPRESENTS THE PERCENTAGE OF DILUTED ORE    *
C*     TONNAGE THAT WILL NOT BE RECUPERATED BY THE MINING METHOD.      *
C*     EACH BLOCK CAN BE INDIVIDUALLY CLASSIFIED AS                    *
C*     MEASURED, INDICATED OR INFERRED ORE IF IO3=0.  IN THIS CASE,    *
C*     PREDETERMINED BLOCK CLASSIFICATIONS CAN BE STORED ON TAPE3      *
C*     (IO2=3) OR READ AFTER OPTION CARDS (IO2=1) ACCORDING TO CARD 3. *
C*     THE RESULTS OF THIS PROGRAM ARE GIVEN ON TABLES DISPLAYING THE  *
C*     ORE AND WASTE TONNAGE FIGURES OF IN-SITU, DILUTED AND           *
C*     RECOVERABLE RESERVES.                                           *
C*     THIS PROGRAM HAS BEEN WRITTEN IN CDC FORTRAN LEVEL 4.8 AND WAS  *
C*     ORIGINALLY CREATED BY RAYMOND SABOURIN (EMR,CANMET,MRL),MAY 1982*
C*                                                                      *
C*********************************************************************
C*                                                                      *
C*                                                                      *
C*********************************************************************
C*                                                                      *
C*                                                                      *
C******OPTIONS READ ON INPUT                                            *
C*                                                                      *
C*     CARD 1 - IO2, IO5, TONFAC, AGRADE, DGRADE, DILFA, RECFA, STD;   *
C*              FORMAT READ IS (2I5,6F10.2);                            *
C*         IO2    - DISKFILE UNIT NUMBER. THI FILE CONTAINS PREDETER-  *
C*                  MINED BLOCK CLASSIFICATIONS;                        *
C*                  IO2 IS NOT USED IF IO3.GT.0 (SEE CARD 2 FOR IO3);   *
```

```
C*                    DEFAULT IS IO2=1 (TAPE1=INPUT)                    *
C*                    WHEN PREDETERMINED BLOCK CLASSIFICATIONS ARE      *
C*                    STORED ON A PERMANENT FILE, IO2=3 AND TAPE3 WILL  *
C*                    BE USED AS THE INPUT DATA FILE(PFNI3)!            *
C*          IO5     - IF IO5=1, ONLY BLOCK GRADES WILL BE READ FROM     *
C*                    INPUT DATA FILE (PFNI1)TAPE4, IN THIS CASE        *
C*                    (PFNI2) TAPE5 NEED NOT BE SPECIFIED.              *
C*                    IF IO5=0, THICKNESS (OR TONNAGE PER UNIT VOLUME)  *
C*                    AND ACCUMULATION (OR METAL PER UNIT VOLUME) WILL  *
C*                    BE READ FROM INPUT DATA FILES (PFNI1) TAPE4 AND   *
C*                    (PFNI2) TAPE5!                                    *
C*          TONFAC  - CONSTANT TONNAGE FACTOR TO BE USED IN COMPUTING   *
C*                    METAL TONNAGE!                                    *
C*                    IF METAL PER UNIT OF VOLUME IS USED, TONFAC=1.0!  *
C*          AGRADE  - CUT-OFF GRADE TO DEFINE ORE RESERVES!             *
C*          DGRADE  - DILUTION GRADE!                                   *
C*          DILFA   - DILUTION FACTOR (PERCENTAGE)!                     *
C*          RECFA   - MINING RECOVERY FACTOR(PERCENTAGE)                *
C*          STD     - LOGNORMAL STANDARD DEVIATION OF UNIT VOLUMES      *
C*                    WITHIN B BLOCK!                                   *
C*                                                                      *
C*      CARD 2 - IO3,IO4,QMREL,QIREL,QFREL                              *
C*               FORMAT READ IS (2I5,3F10.2)                            *
C*          IO3     - OPTION WHICH ALLOWS USER TO SPECIFY PREDETERMINED  *
C*                    BLOCK CLASSIFICATIONS!                            *
C*                    IF IO3=0, USER SPECIFIES BLOCK CLASSIFICATIONS    *
C*                    EITHER ON CARDS (IO2=1) OR ON INPUT DATA FILE     *
C*                    TAPE3 (IO2=3)                                     *
C*                    IF IO3.GT.0, PROGRAM DETERMINES EACH BLOCK        *
C*                    CLASSIFICATION!                                   *
C*                    IF IO3=3, BLOCKS ARE CLASSIFIED ACCORDING TO THE  *
C*                    LOGNORMAL KRIGING STANDARD DEVIATION OF ACCUMULA- *
C*                    TION, I.E. V2=AV2SDL (SEE MEG2300)!               *
C*                    IF IO3=2, BLOCKS ARE CLASSIFIED ACCORDING TO THE  *
C*                    RELATIVE KRIGING PRECISION OF ACCUMULATION OR     *
C*                    METAL, I.E. V2= AV2SD/AK*100 (SEE MEG2300)!       *
C*                    IF IO3=1, BLOCKS ARE CLASSIFIED ACCORDING TO THE  *
C*                    KRIGING STANDARD DEVIATION OF ACCUMULATION OR     *
C*                    METAL, I.E. V2= AV2SD (SEE MEG2300)!              *
C*          IO4     - INDICATES THE NUMBER OF PROBLEMS THE FOLLOWING    *
C*                    MAXIMUMS APPLIES TO!                              *
C*                    IO4=0, OR 1 ,IF ONLY ONE PROBLEM IS TREATED       *
C*                    (SEE NPROB IN MEG2300)!                           *
C*                    IO4=NPROB ,WHEN POLYGONS WERE ESTIMATED!          *
C*          QMERL   - MAXIMUM VALUE FOR TWICE THE STANDARD DEVIATION    *
C*                    OR TWICE THE RELATIVE PRECISION (V2) OF AN ESTIMA-*
C*                    TED BLOCK IN ORDER THAT THE METAL TONNAGE BE      *
C*                    CONSIDERED AS MEASURED TONNAGE!                   *
C*          QIREL   - MAXIMUM (V2) VALUE FOR INDICATED TONNAGE          *
C*          QFREL   - MAXIMUM (V2) VALUE FOR INFERRED TONNAGE           *
C*                                                                      *
C*******OPTIONS READ FROM TAPE(IO2)                                     *
C*                                                                      *
C*      CARD 3 -                                                        *
C*                    THESE CARDS OR RECORDS ARE NOT READ IF IO3.NE.0 ! *
C*                    PREDETERMINED BLOCK CLASSIFICATIONS!              *
C*                                                                      *
```

```
C*      IF NMS.LE.1 (I.E. WHEN POLYGONS ARE TREATED - MEG2300), NPROB
C*      RECORDS OF THE FOLLOWING TYPE ARE READ:
C*
C*      NPOLY,CMES,CIND,CINF
C*      FORMAT READ IS (I10,3F10.3)
C*          NPOLY  - POLYGON IDENTIFIER (INTEGER):
C*          CMES   - MEASURED TONNAGE PROPORTION FOR GIVEN POLYGON:
C*          CIND   - INDICATED TONNAGE PROPORTION:
C*          CINF   - INFERRED TONNAGE PROPORTION:
C*
C*      IF NMS.GE.2 (I.E. WHEN BLOCKS ARE TREATED - MEG2300), OPTIONS
C*      ARE:
C*      K, L, CMES, CIND, CINF, KK, LL, NN:
C*          FORMAT READ IS(2I5,3F10.3,3I5):
C*          K, L   - LINE AND COLUMN INDICES OF FIRST BLOCK OF A SERIES
C*                   HAVING THE SAME VALUES FOR CMES,CIND AND CINF:
C*          CMES   - MEASURED TONNAGE PROPORTION FOR ALL BLOCKS IN THE
C*                   SERIES DEFINED BY INDICES (K,L) AND (KK,LL)
C*                   INCLUSIVELY:
C*          CIND   - INDICATED TONNAGE PROPORTION:
C*          CINF   - INFERRED TONNAGE PROPORTION:
C*          KK, LL - LINE AND COLUMN INDICES OF THE LAST BLOCK OF A
C*                   SERIES  HAVING THE SAME VALUE FOR CNES,CIND AND
C*                   CINF:
C*          NN     - DEFAULT VALUE IS TO BE SET AT ZERO.
C*                   IF NN=1, BLOCKS IN THE SERIES WILL BE ELIMINATED
C*                   FROM CALCULATIONS:
C*
C*               ALL BLOCKS IN THE SERIES (K,L) TO (KK,LL) WILL BE
C*               GIVEN THE SAME PROPORTION OF MEASURED, INDICATED AND
C*               INFERRED ORE TONNAGE. LINE INDICES (K OR KK) ARE
C*               DEFINED FROM TOP TO BOTTOM, COLUMN INDICES (L OR LL)
C*               ARE DEFINED FROM LEFT TO RIGHT. ALL BLOCKS MUST BE
C*               GIVEN A VALUE FOR CMES, CIND AND CINF. CARD 2
C*               FOLLOWED BY CARDS 3 WILL BE READ NPROB TIMES WHEN
C*               I04=0 OR 1.
C*
C*************************************************************************
C*
C*
C*************************************************************************
C*
C******CALCULATED VARIABLES
C*
C*      AV2SDL - TWICE THE LOGNORMAL KRIGING STANDARD DEVIATION:
C*      AV2SD  - NORMAL KRIGING STANDARD DEVIATION:
C*      V2     - REPRESENTS EITHER TWICE THE LOGNORMAL KRIGING STANDARD
C*               DEVIATION (I03=3) OR TWICE THE RELATIVE KRIGING
C*               PRECISION (I03=2) OR TWICE THE NORMAL KRIGING STANDARD
C*               DEVIATION (I03=1).  V2 WILL BE COMPARED WITH QMREL,
C*               QIREL AND QFREL TO DETERMINE WHETHER A BLOCK CAN BE
C*               CLASSIFIED AS MEASURED, INDICATED OR INFERRED.
C*      AGRADE  - CUT OFF GRADE:
C*      OTONMES, OGRAMES, OMETMES - MEASURED ORE TONNAGE, AVERAGE
C*          ORE GRADE, AND METAL ORE POUNDAGE RESPECTIVELY:
C*      OTONIND, OGRAIND, OMETIND - INDICATED ORE VALUES:
C*      OTONINF, OGRAINF, OMETINF - INFERRED ORE VALUES:
```

```
C*      OTONTOT, OGRATOT, OMETTOT - TOTAL ORE VALUES;
C*      WTONMES, WGRAMES, WMETMES - MEASURED WASTE VALUES;
C*      WTONIND, WGRAIND, WMETIND - INDICATED WASTE VALUES;
C*      WTONINF, WGRAINF, WMETINF - INFERRED WASTE VALUES;
C*      WTONTOT, WGRATOT, WMETTOT - TOTAL WASTE VALUES;
C*      DILFA  - DILUTION FACTOR;
C*      DGRADE - DILUTION GRADE;
C*      DTONMES, DGRAMES, DMETMES - MEASURED DILUTED WASTE VALUES;
C*      DTONIND, DGRAIND, DMETIND - INDICATED DILUTED WASTE VALUES;
C*      DTONINF, DGRAINF, DMETINF - INFERRED DILUTED WASTE VALUES;
C*      DTONTOT, DGRATOT, DMETTOT - TOTAL DILUTED WASTE VALUES;
C*      RECFA  - RECOVERY FACTOR;
C*      ROTNMFS, RMETMES - MEASURED RECOVERABLE WASTE VALUES;
C*      RTONIND, RMETIND - INDICATED RECOVERABLE WASTE VALUES;
C*      RTONINF, RMETINF - INFERRED RECOVERABLE WASTE VALUES;
C*      RTONTOT, RGRATOT, RMETTOT - TOTAL RECOVERABLE WASTE VALUES;
C*      ROTNMES, ROMTMES - MEASURED RECOVERABLE ORE VALUES;
C*      ROTNIND, ROMTIND - INDICATED RECOVERABLE ORE VALUES;
C*      ROTNINF, ROMTINF - INFERRED RECOVERABLE ORE VALUES;
C*      ROTNTOT, ROMTTOT - TOTAL RECOVERABLE ORE VALUES;
C*      RTTNMFS, RTGRMES, RTMTMES - TOTAL RECOVERABLE MEASURED VALUES;
C*      RTTNIND, RTGRIND, RTMTIND - TOTAL RECOVERABLE INDICATED VALUES;
C*      RTTNINF, RTGRINF, RTMTINF - TOTAL RECOVERABLE INFERRED VALUES;
C*      RTTNTOT, RTGRTOT, RTMTTOT - RECOVERABLE TOTALS;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******VARIABLES USED
C*
C*      NPROB  - NUMBER OF PROBLEMS STUDIED BY MEG2300;
C*      NMS    - POLYGONS WERE USED BY MEG2300 IF NMS.LE.1;
C*               IF NMS.GT.1, BLOCKS WERE USED;
C*      NPOLYG - NUMBER OF POLYGONS TREATED BY MEG2300 FOR A GIVEN
C*                   PRORLEM (NMS.LE.1);
C*      MN     - PROBLEM COUNTER FOR LARGE DO LOOP;
C*      NX, NY - NUMBER OF BLOCKS FOUND ALONG X AND Y AXES
C*               RESPECTIVELY;
C*
C*****************************************************************
C*
C*
C*****************************************************************
C*
C******VARIABLE DIMENSIONS
C*
C*      K1 - NUMBER OF BLOCKS ON Y-AXIS;
C*      K2 - NUMBER OF BLOCKS ON X-AXIS;
C*      K3 - GREATEST NUMBER OF OBSERVATIONS (SAMPLES) PER
C*           EVALUATION;
C*
C*****************************************************************
C*
C*
C*****************************************************************
```

```
C*
C******DISKFILES USED
C*
C*      TAPE1 - INPUT DATA CARD;
C*      TAPE2 - OUTPUT LISTING;
C*      TAPE3 - FILE CONTAINING PREDETERMINED CLASSIFICATIONS WHEN IO2=3*
C*              THIS FILE WILL CORRESPOND TO PFNI3 PARAMETER ON BEGIN
C*              CARD WHEN IT IS USED;
C*      TAPE4 - FILE CONTAINING GRADES OR ACCUMULATIONS (METAL PER
C*              UNIT VOLUME),(PFNI);
C*      TAPE5 - FILE CONTAINING THICKNESSES (TONNAGE PER UNIT VOLUME)
C*              WHEN IO5=0; OTHERWISE TAPE5 IS NOT USED; THIS FILE
C*              CORRESPONDS TO PFNI2 PARAMETER ON BEGIN CARD WHEN IT IS
C*              USED;
C*      TAPE6 - STORAGE OF RESULTS;
C*
C*****************************************************************************
C*
C*
C*****************************************************************************
C*
C******EXECUTION
C*
C*      H2400,CM70000,T50,IO500,P2.
C*      ACCOUNT,*****,PW=******.
C*      ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
C*      BEGIN,GEM,PROCD,PROGRAMIN=MEG2400,
C*      PFNI= PERMANENT FILE NAME OF MEG2300 OUTPUT FILE FOR THE
C*            ACCUMULATION OR THE METAL PER UNIT AREA.
C*      PFNI2=PERMANENT FILE NAME OF MEG2300 OUTPUT FILE FOR THE
C*            THICKNESS OR  TONNAGE PER UNIT AREA
C*      PFNI3=PERMANENT FILE NAME OF PREDETERMINED BLOCK CLASSIFICATIONS*
C*      Q1    IS THE NUMBER OF BLOCKS ON Y-AXIS;
C*      Q2    IS THE NUMBER OF BLOCKS ON X-AXIS;
C*      Q3    IS THE GREATEST NUMBER OF OBSERVATIONS (SAMPLES) PER
C*            EVALUATION;
C*
C*****************************************************************************
C*
C*
C*****************************************************************************
C*
C******DECLARATIONS
C*
C*****************************************************************************
C*
C*
      REAL HC(K3),AC(K3),AD(K3),HD(K3)
      REAL AR(K3),HB(K3),ETN(8)
      INTEGER IBLOC(K1,K2),URAG(K3)
C*
C*
C*****************************************************************************
C*
C******MAIN BODY OF MEG2400
C*
C*****************************************************************************
```

CHAPTER 2.0
BLANK OPTION CARD SHEET(S)

MEG2400 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE _____
PAGE 1 OF 2
NAME _____

CARD NO. 1

IO2	IO5	TONFAC	AGRADE	DGRADE	DILFA	RECFA	STD
1 — 5	6 — 10	11 — 20	21 — 30	31 — 40	41 — 50	51 — 60	61 — 70

FORMAT(2I5,6F10.2)

CARD NO. 2

IO3	IO4	QMREL	QIREL	QFRIEL	FORMAT(2I5,3F10.2)
1 — 5	6 — 10	11 — 20	21 — 30	31 — 40	

CARDS NO. 3 ARE READ IF IO3 = 0

IF NMS = 1 (POLYGONS) (NPROB CARDS NO. 3 ARE READ)

CARDS NO. 3

NPOLY	CMES	CIND	CINF	FORMAT (I10,3F10.3)
1 — 10	11 — 20	21 — 30	31 — 40	

MEG2400 - OPTION CARDS

VERSION NO. 1
MAY, 1982

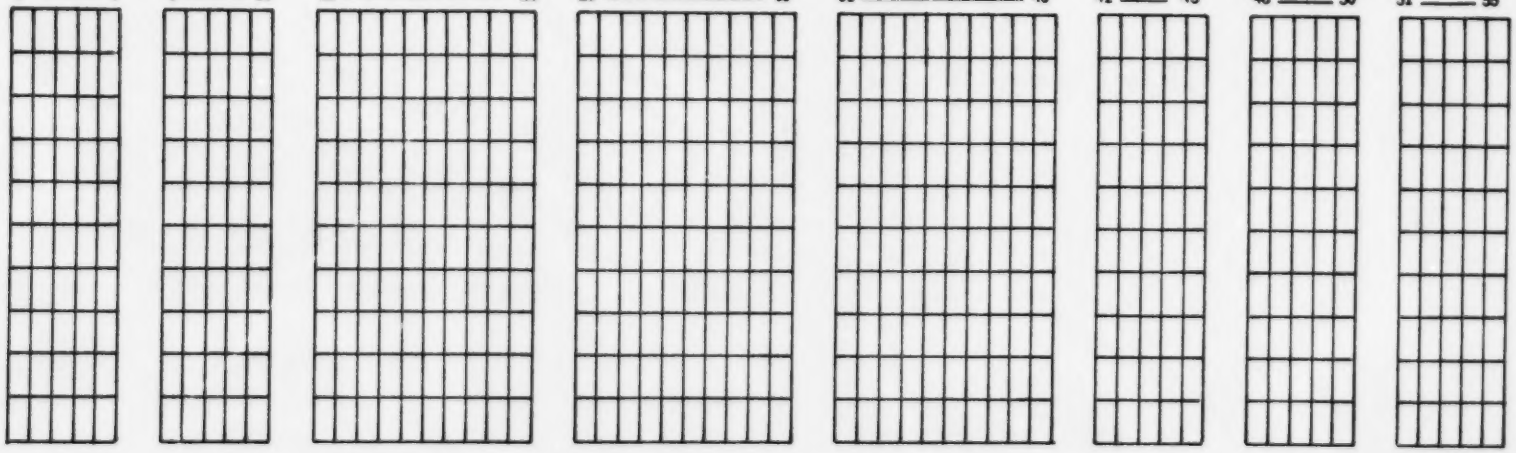
DATE _____
PAGE 2 OF 2
NAME _____

** CARDS NO. 3 ARE READ IF I03 = 0**

IF NMS .GE. 2 (REGULAR BLOCKS)

CARDS NO. 3

K	L	CMES	CIND	CINF	KK	LL	NN
1 — 5	6 — 10	11 — 20	21 — 30	31 — 40	41 — 45	46 — 50	51 — 55



```
EXECUTION:  H2400,CM70000,T50,I0500,P2,
            ACCOUNT,*****,PW=******.
            ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
            BEGIN,GEM,PROCD,PROGRAMIN=MEG2400,
            PFNI=                    ,PFNI2=
            PFNI3=                   ,Q1=     ,Q2=     ,Q3=     .
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2400 - OPTION CARDS

VERSION NO. 1
MAY, 1982

DATE 13-10-82
PAGE 1 OF 2
NAME R&

CARD NO. 1

IO2	IO5	TONFAC	AGRADE	DGRADE	DILFA	RECFA	STD
1	1	12.0	0.0	10.0	10.0	95.0	1.0

FORMAT(2I5,6F10.2)

CARD NO. 2

IO3	IO4	QMREL	QIREL	QFRIEL
1	0	1.5	2.0	2.5

FORMAT(2I5,3F10.2)

CARDS NO. 3 ARE READ IF IO3 = 0

IF NMS = 1 (POLYGONS) (NPROB CARDS NO. 3 ARE READ)

CARDS NO. 3 (NOT USED)

NPOLY	CMES	CIND	CINF

FORMAT (I10,3F10.3)

MEG2400 - OPTION CARDS

VERSION NO. 1
MAY, 1982

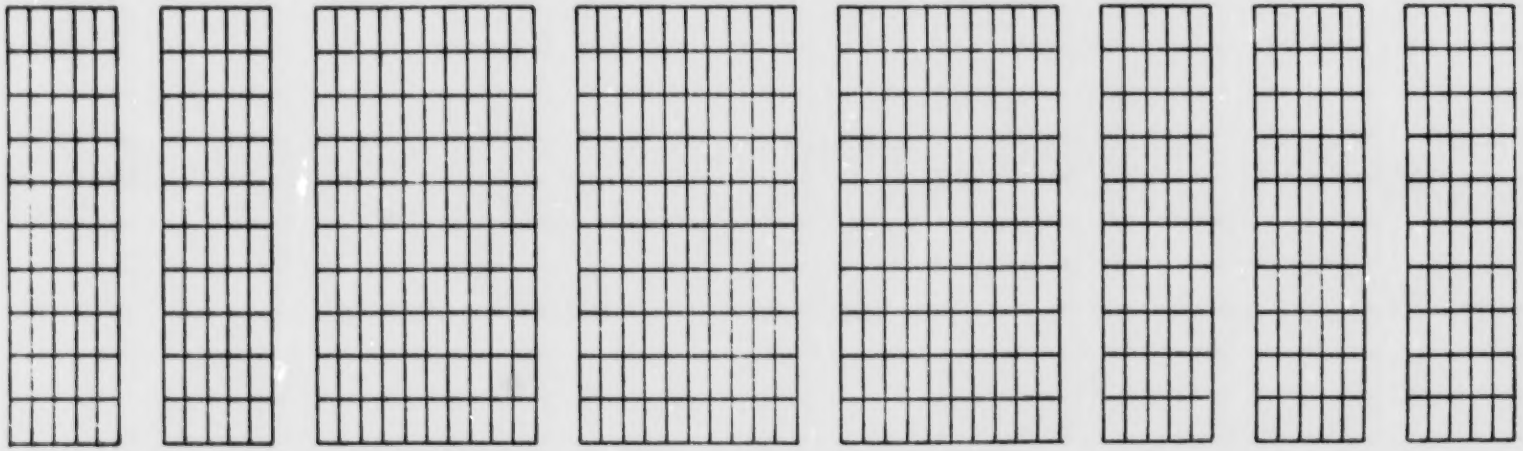
DATE 13-10-82
PAGE 2 OF 2
NAME RS

** CARDS NO. 3 ARE READ IF I03 = 0**

IF NMS .GE. 2 (REGULAR BLOCKS)

CARDS NO. 3 (NOT USED)

K	L	CMES	CIND	CINF	KK	LL	NN
1 — 5	6 — 10	11 — 20	21 — 30	31 — 40	41 — 45	46 — 50	51 — 55



EXECUTION:
```
H2400,CM70000,T50,I0500,P2,
ACCOUNT,*****,PW=******.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=***,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2400,
PFNI=MEG2300DATATEST ,PFNI2=
PFNI3=                ,Q1= 3   ,Q2= 3   ,Q3= 16 .
```

```
      PROGRAM GEM2400(INPUT,OUTPUT,TAPE1=INPUT,TAPE2=OUTPUT,TAPE3,
     -                TAPE4,TAPE5,TAPE6)
      REAL AB(16),HB(16),HC(16),AC(16),AD(16),HD(16)
      INTEGER IBLOC(3,3),MOUS(16)
C*    NUMBER OF BLOCKS ON Y-AXIS
      K1=3
C*    NUMBER OF BLOCKS ON X-AXIS
      K2=3
C*    MAXIMAL NUMBER OF POINTS FOR EACH BLOCK EVALUATION
      K3=16
      CALL MEG2400(IBLOC,AB,HB,MOUS,HC,HD,AC,AD,K1,K2,K3)
      STOP
      END
```

OPTIONS APPLIED

CARD	OPTION		DESCRIPTION
1	IO2=	1	UNIT NUMBER OF FILE CONTAINING BLOCK SPECIFICATIONS;
	IOS=	1	OPTION INDICATING TREATMENT OF BLOCK GRADES (IOS=1) OR OF THICKNESS AND ACCUMULATION (IOS=0);
	TONFAC=	12.00000	TONNAGE FACTOR USED IN COMPUTING METAL TONNAGE;
	AGRADE=	0.00000	CUTTING GRADE USED IN SELECTING BLOCKS;
	DGRADE=	10.00000	DILUTION GRADE;
	DILFA=	10.00000	DILUTION FACTOR (PERCENTAGE);
	RECFA=	95.00000	RECUPERATION FACTOR (PERCENTAGE);
	STD=	1.000000	STANDARD DEVIATION OF GRADES;
	MN=	1	PROBLEM NUMBER;
	NPROB=	1	TOTAL NUMBER OF PROBLEMS STUDIED;
2	IO3=	1	OPTION ALLOWING USER TO SPECIFY BLOCK OR POLYGON RESTRAINTS (IO3=0), OR TO USE CALCULATED DEFAULT VALUES (IO3=1.23);
	IO4=	0	NUMBER OF PROBLEMS TO WHICH THE FOLLOWING THREE VALUES WILL BE APPLIED;
	QMREL=	1.500000	UPPER LIMIT OF ACCEPTABLE VALUES FOR MEASURED TONNAGE;
	QIREL=	2.000000	UPPER LIMIT OF ACCEPTABLE VALUES FOR INDICATED TONNAGE;
	QFREL=	2.500000	UPPER LIMIT OF ACCEPTABLE VALUES FOR INFERRED TONNAGE;
	NMS=	2	POLYGON/BLOCK OPTION, READ FROM TAPE 4

NUMBER OF HORIZONTAL BLOCKS; 3
NUMBER OF VERTICAL BLOCKS; 3

IBLOC(NX,NY)

1 1 1
1 1 1
1 1 1

BLOCK SELECTION FOR 3 CATEGORIES OF RESERVE

MEASURED

I	J	NPOLYG	CMES
1	1	0	1.00
2	1	0	1.00
2	3	0	1.00
3	3	0	1.00

INDICATED

I	J	NPOLYG	CIND
1	3	0	1.00
2	2	0	1.00
3	1	0	1.00

INFERRED

I	J	NPOLYG	CINF
1	2	0	1.00
3	2	0	1.00

URANIUM RESOURCES

IN-SITU / ORE

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	41666.67	35.79	1491217.50
INDICATED (I)	31250.00	36.79	1149651.77
INFERRED (N)	20833.33	35.28	734896.46
TOTAL	93750.00	36.01	3375765.73

URANIUM RESOURCES
IN-SITU / WASTE

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	0.00	0.00	0.00
INDICATED (I)	0.00	0.00	0.00
INFERRED (N)	0.00	0.00	0.00
TOTAL	0.00	0.00	0.00

URANIUM RESOURCES

DILUTED / WASTE

DILUTION FACTOR = 10.0 PERCENT DILUTION GRADE =10.00 LB/TON

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	4166.67	10.00	41666.67
INDICATED (I)	3125.00	10.00	31250.00
INFERRED (N)	2083.33	10.00	20833.33
TOTAL	9375.00	10.00	93750.00

URANIUM RESOURCES

RECOVERABLE / WASTE

RECOVERY FACTOR= 95.0 PERCENT

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	3958.33	10.00	39583.33
INDICATED (I)	2968.75	10.00	29687.50
INFERRED (M)	1979.17	10.00	19791.67
TOTAL	8906.25	10.00	89062.50

URANIUM RESOURCES

RECOVERABLE / ORE

RECOVERY FACTOR= 95.0 PERCENT

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	39583.33	35.79	1416656.63
INDICATED (I)	29687.50	36.79	1092169.18
INFERRED (N)	19791.67	35.28	698151.64
TOTAL	89062.50	36.01	3206977.44

URANIUM RESOURCES
RECOVERABLE / TOTAL

RECOVERY FACTOR= 95.0 PERCENT

CUT OFF GRADE : 0.00 LB/S.TONS

	ORE TONNAGE S.TONS	AVERAGE GRADE LB/S.TONS	METAL LBS U3O8
MEASURED (M)	43541.67	33.44	1456239.96
INDICATED (I)	32656.25	34.35	1121856.68
INFERRED (N)	21770.83	32.98	717943.30
TOTAL	97968.75	33.64	3296039.94

REFERENCES

1. Sabourin, R.L., "Program MEG2300 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-111(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.

ERP – MRL

82-113 TR

Energy, Mines and Resources Canada / Énergie, Mines et Ressources Canada

CANMET

Canada Centre for Mineral and Energy Technology / Centre canadien de la technologie des minéraux et de l'énergie

PROGRAM MEG2560 USER'S GUIDE - GEM SYSTEM -
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION

VERSION I

R.L. Sabourin
Mine Evaluation Group

October 1982

This docum[illegible] interim report [illegible] [illegible] purposes [illegible] represent [illegible] the opinion of the [illegible] for Mineral and En[illegible] (CANMET)

[illegible] est un rapport [illegible] rédigé [illegible] de [illegible] nulle- [illegible] définitive de [illegible] canadien de [illegible] minéraux et de l'énergie (CANMET)

35pp

ENERGY RESEARCH PROGRAM
MINING RESEARCH LABORATORIES
DIVISION REPORT ERP/MRL 82-113(TR)

PROGRAM MEG2560 USER'S GUIDE - GEM SYSTEM
CANMET SYSTEMS FOR MINERAL RESERVE EVALUATION
VERSION I

by

R.L. Sabourin*

ABSTRACT

The purpose of program MEG2560 is to draw a colored map with contour lines using the Applicon color plotter and Applicon software subroutines. The values of the variable contoured must be distributed on a rectangular grid and all values must be provided. The program finds the coefficients of a two-dimensional bi-cubic polynomial for each grid cell. The applicon color plotter generates plots in metric units and the maximum resolution is 0.2 millimeters. The resolution of the contours is dependent on the size of a rectangular sub-cell chosen by the user. The real scale area of each contour limit is automatically calculated by MEG2560.

The input linary file of MEG2560 is provided by MEG2300 or by the user.

The documentation of this program is technical and is subject to further verification and revision. However, the information conveyed by this report is of sufficient value to merit public distribution.

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GUIDE D'USAGER POUR LE PROGRAMME MEG2560
SYSTÈME GEM - SYSTÈMES CANMET POUR L'ÉVALUATION DES RÉSERVES MINÉRALES
VERSION I

R.L. Sabourin*

RÉSUMÉ

Le but du programme MEG2560 est de dessiner une carte en couleur avec des lignes de contours en utilisant le traceur et les sousroutines d'Applicon. Des valeurs des variables tracées doivent être fournies par l'utilisateur et doivent être réparties sur une maille régulière. Le programme calcule les coefficients d'un polynome bi-cubique défini sur deux dimensions pour chaque cellule de la maille régulière. Le traceur Applicon dessinera une carte ayant des dimensions métriques, et la résolution maximum des lignes de contours est de 0,2 milimètres. La résolution des lignes de contours dépend de la dimension des sous cellules rectangulaires choisies par l'utilisateur. La surface réelle définie par deux limites de contours est automatiquement calculée par MEG2560. Le fichier d'entrée de MEG2560 est fourni par MEG2300 ou par l'utilisateur.

La documentation de ce programme est technique et peut avoir à subir des vérifications et faire l'objet de révision. Cependant, on croit que l'information contenue dans ce rapport est suffisamment valable pour faire l'objet de diffusion au public.

*Géologue minier et géostatisticien, Laboratoires de recherches minières, Centre canadien de la technologie des minéraux et de l'énergie (CANMET), Energie, Mines et Ressources, Canada, Ottawa.

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CHAPTER 1.0
GENERAL DOCUMENTATION

```
      SUBROUTINE MEG2560(   P,Q,S,GP,GY2,GZ1,GZ2,GG2,GX1,GX2,GY1,XC,XD,
     -       YX,G,GG1,A,B,C,K4,K5,K6,K8,NUANCE,IBL)
C*                                                                     *
C*                                                                     *
C***********************************************************************
C*                                                                     *
C******GENERAL DESCRIPTION                                            *
C*                                                                     *
C*     GEM2560 IS A FORTRAN PROGRAM USING APPLICON HARDWARE AND SOFT-  *
C*     WARE WHICH DRAWS A COLOR MAP WITH CONTOUR LINES. A REGULAR GRID *
C*     OF DATA MUST BE GIVEN TO THE PROGRAM USING EITHER KRIGING OR    *
C*     ANOTHER ESTIMATION METHOD. ALL VALUES AT THE REGULAR GRID POINTS*
C*     SHOULD BE SPECIFIED.                                            *
C*     MISSING VALUES ARE INTERPRETED AS ZERO AND MAY HAVE AN          *
C*     INFLUENCE ON THE FINAL CONTOURS. THE PROGRAM IS USING VARIABLE  *
C*     DIMENSIONS AND A BLANKING OPTION IS ALSO AVAILABLE.             *
C*                                                                     *
C*     THE PROGRAM FINDS THE COEFFICIENTS OF A TWO DIMENSIONAL BI-CUBIC*
C*     POLYNOMIAL FOR EACH GRID CELL. THE POLYNOMIAL MUST FIT EXACTLY  *
C*     THE FOUR DATA VALUES AT THE CORNER OF EACH GRID CELL AND MUST   *
C*     HAVE EQUIVALENT FIRST AND SECOND DERIVATIVES WITH ADJACENT GRID *
C*     CELLS.                                                          *
C*     THE APPLICON COLOR PLOTTER GENERATES THE COLOR PLOTS. APPLICON  *
C*     COLOR PLOTTING SUBROUTINES ARE USED TO DRAW THE MAP. THE        *
C*     PROGRAM HAS BEEN WRITTEN IN CDC FORTFAN LEVEL 4.8 AND WAS       *
C*     CREATED BY RAYMOND SABOURIN AND DENISE GROLEAU (EMR,CANMET,MRL) *
C*     JULY, 1982.                                                     *
C*                                                                     *
C******HARDWARE/SOFTWARE                                              *
C*     THIS GRAPHICAL APPLICATION PROGRAM NEEDS SPECIAL HARDWARE/SOFT- *
C*     WARE.                                                           *
C*     HARDWARE REQUIREMENTS ARE:                                      *
C*         APPLICON COLOR PLOTTER                                      *
C*     SOFTWARE REQUIREMENTS ARE:                                      *
C*         APPLICON COMPATIBLE ROUTINES (FORTRAN CALL ROUTINES),       *
C*         APPLICON PLOTTING SOFTWARE (SUPPORTED BY THE COMPUTER       *
C*         SCIENCE CENTER) (OPTIONAL).                                 *
C*                                                                     *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                     *
C******OPTIONS READ ON INPUT                                           *
C*                                                                     *
C*     CARD 1 - NBINTX,NBINTY,M,N,RESOLX,RESOLY                        *
C*              FORMAT READ IS FREE FORMAT; A BLANK SPACE OR COMMA      *
C*              SHOULD BE INSERTED BETWEEN OPTION VALUES.              *
C*         NBINTX - THE NUMBER OF INTERPOLATION POINTS OR SUB-CELLS     *
C*                  IN X FOR ONE CELL (INTEGER)                        *
C*         NBINTY - THE NUMBER OF INTERPOLATION POINTS OR SUB-CELLS     *
C*                  IN Y FOR ONE CELL (INTEGER)                        *
C*         M      - THE NUMBER OF GRID CELLS+1 IN X FOR                *
C*                  GP(M,N) (INTEGER)                                  *
C*         N      - THE NUMBER OF GRID CELLS+1 IN Y FOR                *
C*                  GP(M,N) (INTEGER)                                  *
C*                  M AND N ALSO CORRESPONDS TO THE NUMBER OF DATA     *
```

```
C*                  POINTS RESPECTIVELY IN X AND Y.                    *
C*            RESOLX - LENGTH IN X OF ONE SUB-CELL IN MILLIMETERS (REAL) *
C*            RESOLY - WIDTH IN Y OF ONE SUB-CELL IN MILLIMETERS (REAL)  *
C*                 THE HORIZONTAL AND VERTICAL DIMENSIONS OF THE APPLICON *
C*                 PLOT WILL RESPECTIVELY BE                             *
C*                 XD=((M-1) * NBINTX * RESOLX), AND                     *
C*                 YD=((N-1) * NBINTY * RESOLY).                         *
C*                 XD AND YD ARE EXPRESSED IN MILIMETERS. THE SCALE OF   *
C*                 THE MAP WILL BE                                       *
C*                 XD / (1000*XSIZE) = YD / (1000*YSIZE) (SEE OPTION     *
C*                 CARD 4).                                              *
C*                 THE FACTOR (1000) IS NECESSARY TO TRANSFORM XD AND YD *
C*                 IN METERS.                                            *
C*                                                                       *
C*      CARD 2 - IBLA,TEXT,SURFA,DRAW                                    *
C*               FORMAT(A10,3A10,A9,A7)                                  *
C*           IBLA    - BLANKING OPTION WITH TWO POSSIBILITIES:           *
C*                     (ALPHANUMERIC)                                    *
C*                     NOBLANKING - NO BLANKING CARRIED OUT              *
C*                     BLANKING   - CERTAIN GRID CELLS ARE TO BE BLANKED *
C*                                  OUT. (APPLICON PEN IS IN UP POSITION)*
C*           TEXT    - TITLE OF THE MAP. MAXIMUM OF 30 CHARACTERS.       *
C*                     (ALPHANUMERIC). THE INPUT DATA HAS THE FALLOWING  *
C*                     FORM "_____$ "                                    *
C*           SURFA   - UNITY OF SURFACE OF SUB-CELLS. POSSIBILITY OF 5   *
C*                     CHARACTERS.                                       *
C*                     IMPERIAL OR METRIC SYSTEM (SQ.KM,SQ.MI,SQ.M,SQ.FT)*
C*                     (ALPHANUMERIC). THE INPUT DATA HAS THE FALLOWING  *
C*                     FORM "_____$ "                                    *
C*           DRAW    - TWO POSSIBILITIES: (ALPHANUMERIC)                 *
C*                     NCOLOR - ONLY THE CONTOUR LINES ARE DRAWN.        *
C*                     COLOR  - COLORS AND CONTOUR LINES ARE DRAWN.      *
C*                                                                       *
C*      CARD 3 - OPT,CONTOU,TEINTE                                       *
C*               FORMAT READ IS FREE FORMAT                              *
C*           OPT     - TWO POSSIBILITIES: (INTEGER)                      *
C*                     0 - THE USER DEFINES CONTOUR LIMIT VALUES         *
C*                     1 - SUBROUTINE IMAPSC (APPLICON SOFTWARE) GENERATES*
C*                         CONTOUR LIMIT VALUES                          *
C*           CONTOU  - TWO POSSIBILITIES: (INTEGER)                      *
C*                     0 - THE CONTOU LINES HAVE ALL THE SAME WIDTH,     *
C*                         I.E. 0.2 MILIMETER.                           *
C*                     1 - THE CONTOU LINES WIDTH MAY BE 0.4 OR 0.2      *
C*                         MILIMETER.                                    *
C*           TEINTE  - THREE POSSIBILITIES: (INTEGER)                    *
C*                     0 - SUBROUTINE IMAPCO (APPLICON SOFTWARE) IS USED *
C*                         TO DEFINE (MAXIMUM 40) COLOR CODES FROM A     *
C*                         STANDARD SET OF COLORS.                       *
C*                     1 - COLORS (MAXIMUM OF 40) DEFINED BY THE PROGRAM *
C*                     2 - COLORS (MAXIMUM 40) ARE DEFINED BY THE USER.  *
C*                         THE NUMBER OF COLOR CODES IS EQUAL TO THE     *
C*                         NUMBER OF CONTOUR LINES PLUS ONE. (6 DIGIT CODE*
C*                         (00-16) FOR ONE COLOR) SEE APPLICON COLOR     *
C*                         PLOTTER. THESE COLORS ARE DEFINED BY CARD 8   *
C*                                                                       *
C*      CARD 4 - XOMAP,YOMAP,XSIZE,YSIZE                                 *
C*               FORMAT READ IS FREE FORMAT                              *
```

```
C*          XOMAP  - SOUTH-WEST DEPARTURE (REAL SCALE COORDINATE SYSTEM) *
C*                   OF MAP (REAL)                                       *
C*          YOMAP  - SOUTH-WEST LATITUDE (REAL SCALE COORDINATE SYSTEM)  *
C*                   OF MAP (REAL)                                       *
C*          XSIZE  - LENGTH ALONG DEPARTURE OF MAP (REAL SCALE) (REAL)   *
C*          YSIZE  - LENGTH ALONG LATITUDE OF MAP (REAL SCALE) (REAL)    *
C*                                                                       *
C*      CARD 5 - NC                                                      *
C*               FORMAT READ IS FREE FORMAT                              *
C*               DO NOT SPECIFY CARD 5 WHEN OPT IS 1                     *
C*          NC     - NUMBER OF CONTOUR GROUPS WITH DIFFERENT CONTOUR     *
C*                   INTERVALS (INTEGER)                                 *
C*                                                                       *
C*      CARD 6 - INF,SUP,INTER                                           *
C*               FORMAT READ IS FREE FORMAT                              *
C*               DO NOT SPECIFY CARD 6 WHEN OPT IS 1: THIS CARD IS       *
C*               REPEATED NC TIMES.                                      *
C*          INF    - INFERIOR CONTOUR VALUE (REAL)                       *
C*          SUP    - SUPERIOR CONTOUR VALUE (REAL)                       *
C*          INTER  - CONTOUR INTERVAL (REAL)                             *
C*                                                                       *
C*      CARD 7 - NCLZ                                                    *
C*               FORMAT READ IS FREE FORMAT                              *
C*               DO NOT SPECIFY CARD 7 WHEN OPT IS 0                     *
C*          NCLZ   - SPECIFIES THE TOTAL NUMBER OF CONTOUR CLASSES       *
C*                   LIMITS                                              *
C*                                                                       *
C*      CARD 8 - (KOLORS(IK),IK=1,NCLZ+1)                                *
C*               FORMAT READ IS FREE FORMAT                              *
C*               DO NOT SPECIFY CARD 8 WHEN TEINTE IS 0 OR 1             *
C*          KOLORS - 6 DIGITS CODES FOR ONE COLOR BETWEEN 00,16,THE      *
C*                   NUMBER OF COLORS MUST BE NCLZ + 1.  (INTEGER)       *
C*                                                                       *
C*      CARD 9 - (ILINEW(I),I=1,NCLZ+1)                                  *
C*               FORMAT READ IS FREE FORMAT                              *
C*               DO NOT SPECIFY CARD 9 WHEN CONTOU IS 0  (INTEGER)       *
C*          ILINEW - IS AN ARRAY OF VALUES INDICATING IF A CONTOUR LINE  *
C*                   WIDTH IS 0.2 OR 0.4 MILIMETER. ILINEW(1) DEFINES    *
C*                   THE INFERIOR CONTOUR VALUE OF THE FIRST CONTOUR     *
C*                   GROUP. THE NUMBER OF ILINEW VALUES CORRESPONDS TO   *
C*                   THE TOTAL NUMBER OF CONTOURS DESIRED.               *
C*                   0 - THE WIDTH OF THE CONTOUR LINE IS 0.2            *
C*                   1 - THE WIDTH OF THE CONTOUR LINE IS 0.4            *
C*                                                                       *
C*      CARD 10- ((IBL(I,J),I=1,M-1),J=1,N-1)                            *
C*               FORMAT READ IS FREE FORMAT                              *
C*                   DO NOT SPECIFY CARD 10 WHEN IBLA IS NOBLANKING      *
C*          IBL    - MATRIX OF BLANKING-NOBLANKING INDICATORS            *
C*                   TWO POSSIBILITIES:                                  *
C*                   1 - NOBLANKING IN THE GRID CELL (I,J)               *
C*                   0 - THE GRID CELL (I,J) IS TO BE BLANKED. (APPLI-   *
C*                       CON PEN IS UP)                                  *
C*                                                  1  0  1              *
C*                                                  0  1  0              *
C*                                                  0  1  1              *
C*                   IBL(I,J) = 0,1,1,0,1,0,1,0,1                        *
C*                   IBL VALUES ARE READ LINE BY LINE FROM LEFT
```

```
C*                    TO RIGHT AND FROM BOTTOM TO TOP. J=1, CORRES-  *
C*                    POND TO THE BOTTOM LINE AND I=1, CORRESPOND    *
C*                    TO THE LEFT MOST COLUMN.                       *
C*                                                                   *
C*******************************************************************
C*
C*
C*******************************************************************
C*                                                                   *
C******DESCRIPTION OF PARAMETERS                                     *
C*                                                                   *
C*     P,Q,S,G- TWO DIMENSIONAL MATRICES WHICH ARE ONLY DEFINED AND  *
C*              USED IN SUBROUTINE MEG2561(SPLIN) TO CALCULATE       *
C*              COEFFICIENTS OF BICUBIC POLYNOMIAL                   *
C*     GP     - MATRIX OF ORIGINAL DATA GRID M * N POINTS           *
C*     XC,XD,YX,                                                     *
C*     GG1,GG2,                                                      *
C*     GX1,GX2,                                                      *
C*     GY1,GY2,                                                      *
C*     GZ1,GZ2- MATRICES DEFINED AND USED IN SUBROUTINE MEG2561(SPLIN) *
C*    A,B,C   - MATRIX A(4,4) FOR 16 BICUBIC COEFFICIENTS FOR EACH GRID*
C*              CELL. THE PROGRAM STORES IN SUBROUTINE MEG2561(SPLIN) *
C*              THE (M-1) BY (N-1) GROUPS OF SUCH COEFFICIENTS. THE   *
C*              BICUBIC COEFFICIENTS ARE STORED ON TAPE7.             *
C*    NUANCE  - ARRAY OF COLORS GIVEN TO THE SUB-CELLS LOCATED AT THE *
C*              TOP LINE WITHIN A CELL.                               *
C*    IBL     - MATRIX (K4,K5) BLANKING INDICATOR                     *
C*                                                                   *
C*******************************************************************
C*
C*
C*******************************************************************
C*                                                                   *
C******VARIABLE DIMENSIONS                                           *
C*                                                                   *
C*     K4 - NUMBER OF GRID CELLS+1 IN X DIRECTION. K4=M              *
C*     K5 - NUMBER OF GRID CELLS+1 IN Y DIRECTION. K5=N              *
C*     K6 - IS THE MAXIMUM OF EITHER K4 OR K5                        *
C*     K8 - IS THE NUMBER OF SUB-CELL IN X * (K4 - 1)                *
C*                                                                   *
C*******************************************************************
C*
C*
C*******************************************************************
C*                                                                   *
C******FILES USED                                                    *
C*                                                                   *
C*     INPUT - INPUT DATA CARDS                                      *
C*     TAPE1 - CREATES THE PLOT TAPE1 FOR APPLICON                   *
C*     TAPE2 - DATA FILE OF GRID POINTS VALUES (UNFORMATED FILE) (PFNI)*
C*     TAPE6 - OUTPUT FILE FOR APPLICON                              *
C*     TAPE7 - OUTPUT UNFORMATED FILE OF BICUBIC COEFFICIENTS OF EACH *
C*             CELL                                                  *
C*     TAPE25- APPLICON PLOT COMMANDS ARE WRITTEN TO TAPE 25         *
C*     TAPE28- FOR APPLICON USE                                      *
C*     TAPE29- FOR APPLICON USE                                      *
C*     OUTPUT- OUTPUT LISTING                                        *
```

```
C*                                                                      *
C***********************************************************************
C*                                                                      *
C******OUTPUT DISPOSITION                                               *
C*                                                                      *
C*     SECTION 1 - INPUT PARAMETERS                                     *
C*                                                                      *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                      *
C******REQUIRED SUBROUTINES                                             *
C*                                                                      *
C*     MEG2561 - (SPLIN) FINDS 16 BICUBIC COEFFICIENTS FOR EACH         *
C*               CELL OF THE ORIGINAL GRID M BY N                       *
C*               POINTS = (M-1) BY (N-1) CELLS                          *
C*     MEG2562 - DRAWS THE VERTICAL LINES FOR CONTOURING                *
C*     MEG2563 - DRAWS THE HORIZONTAL LINES FOR CONTOURING              *
C*     MEG2564 - SUBROUTINE REQUIRED TO DEFINE COLOR CODES              *
C*     MEG2565 - INTERPOLATES VALUES WITHIN A CELL WITH 16 BICUBIC      *
C*               COEFFICIENTS                                           *
C*     MEG2566 - DRAWS THE "DEPARTURE" AND "LATITUDE"                   *
C*               AT THE FOUR CORNERS OF THE MAP                         *
C*                                                                      *
C***********************************************************************
C*
C*
C***********************************************************************
C*                                                                      *
C******EXECUTION                                                        *
C*                                                                      *
C*     H2560,CM137000,IO300,T300,P2,HD1.                                *
C*     ACCOUNT,*****,PW=******.                                         *
C*     ATTACH,PROCD,MEGPROCD2560,ID=MEGPR,MR=1.                         *
C*     BEGIN,GEM,PROCD,PROGRAMIN=MEG2560,                               *
C*     PFNI DATA FILE OF GRID POINT VALUES (TAPE2)                      *
C*     Q4 = NUMBER OF GRID CELLS+1, IN X, Q4=M                          *
C*     Q5 = NUMBER OF GRID CELLS+1, IN Y, Q5=N                          *
C*     Q6 = THE MAXIMUM OF EITHER Q4 OR Q5                              *
C*     Q8 = THE NUMBER OF SUB-CELL IN X * (Q4 - 1).                     *
C*                                                                      *
C***********************************************************************
C*
C*
C*
C*
C***********************************************************************
C*                                                                      *
C******DECLARATIONS                                                     *
C*                                                                      *
C***********************************************************************
C*
      DIMENSION GG1(K6),  P(K4,K5),Q(K4,K5),
     -          S(K4,K5),GP(K4,K5),GY2(K6),GZ1(K6),
     -          GZ2(K6),GG2(K6),GX1(K6),GY1(K6),XC(K6),
     -          XD(K6),G(K6),A(4,4),C(4,4),B(16)
```

CHAPTER 2.0

BLANK OPTION CARD SHEET(S)

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE _____
PAGE 1 OF 5
NAME _____

CARD NO. 1

NBINTX,NBINTY,M,N,RESOLX,RESOLY (FREE FORMAT)

CARD NO. 2

IBLA TEXT SURFA DRAW

FORMAT(A10,3A10,A9,A7)

CARD NO. 3

OPT,CONTOU,TEINTE (FREE FORMAT)

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE _____
PAGE 2 OF 5
NAME _____

CARD NO. 4

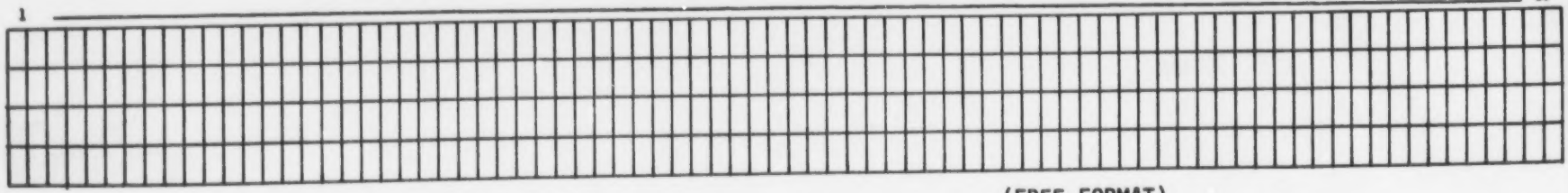
XOMAP,YOMAP,XSIZE,YSIZE

CARD NO. 5

NC (CARD NO. 5 IS NOT READ IF OPT=1) (FREE FORMAT)

CARD NO. 6

INF,SUP,INTER (CARDS NO. 6 ARE NOT READ IF OPT=1, OTHERWISE CARD NO. 6 REPEATED NC TIMES)



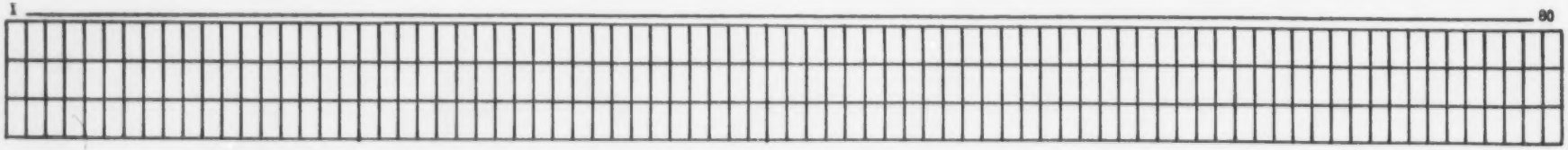
(FREE FORMAT)

CARD NO. 7

NCLZ (CARD NO. 7 IS NOT READ IF OPT=0) (FROM FORMAT)

CARD NO. 8

(KOLORS(IK),IK=1,NCLZ+1) (FREE FORMAT)



CARD NO. 9

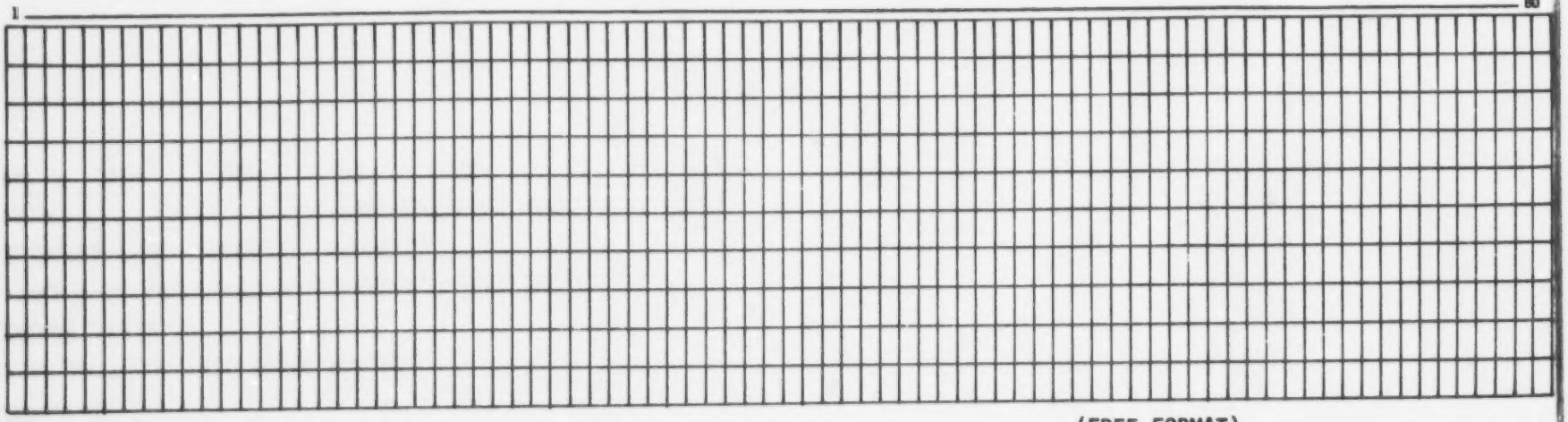
(ILINEW(I),I=1,NCLZ+1)

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE _____
PAGE 4 OF 5
NAME _____

CARD NO. 10
((IBL(I,J),I=1,M-1),J=1,N-1) (NOT READ IF IBLA=NOBLANKING)



(FREE FORMAT)

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE _____
PAGE 5 OF 5
NAME _____

EXECUTION

```
H2560,CM170000,T400,IO400,HD1,P2.
ACCOUNT,XXXXX.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=XXXX,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2560,
PFNI=                    ,(PERMANENT FILE NAME INPUT FILE)
Q4=     ,Q5=     ,Q6=     ,Q7=     ,Q8=     .
```

CHAPTER 3.0

EXECUTION OF THE PROGRAM WITH TEST DATA

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE 14-10-82
PAGE 1 OF 5
NAME [illegible]

CARD NO. 1
NBINTX,NBINTY,M,N,RESOLX,RESOLY (FREE FORMAT)

1 ——— 80

200	200	3	3	0.5	0.5

CARD NO. 2

IBLA	TEXT	SURFA	DRAW
1 ——— 10	11 ——— 40	41 ——— 45 ——— 49	50 ——— 56
NØBLANKING	"BLOCK KRIGING EXAMPLE $ "	"FT*FT$ "	CØLØR

FORMAT(A10,3A10,A9,A7)

CARD NO. 3
OPT,CONTOU,TEINTE (FREE FORMAT)

1 ——— 80

0	0	1

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NAME RB

CARD NO. 4

XOMAP,YOMAP,XSIZE,YSIZE

1 80

125.0 175.0 150.0 150.0

15

CARD NO. 5

NC (CARD NO. 5 IS NOT READ IF OPT=1) (FREE FORMAT)

1 80

1

CARD NO. 6

INF,SUP,INTER (CARDS NO. 6 ARE NOT READ IF OPT=1, OTHERWISE CARD NO. 6 REPEATED NC TIMES)

1 80

34 40 1

(FREE FORMAT)

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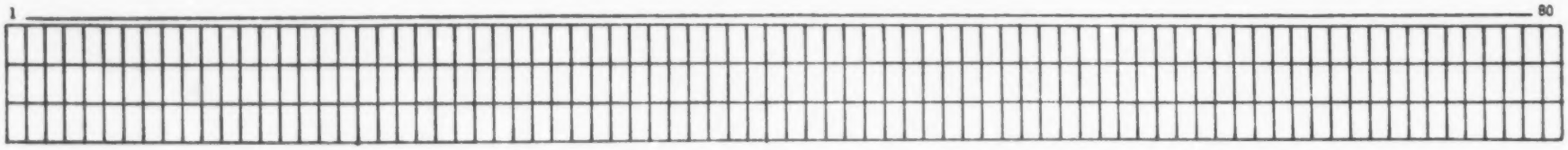
NAME RF

CARD NO. 7 (NOT USED)

NCLZ (CARD NO. 7 IS NOT READ IF OPT=0) (FROM FORMAT)

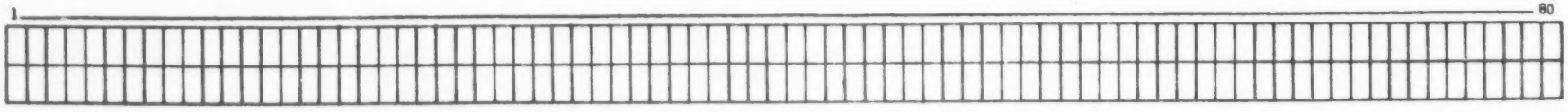
CARD NO. 8 (NOT USED)

(KOLORS(IK),IK=1,NCLZ+1) (FREE FORMAT)



CARD NO. 9 (NOT USED)

(ILINEW(I),I=1,NCLZ+1)



16

MEG2560 - OPTION CARDS

VERSION NO. 1
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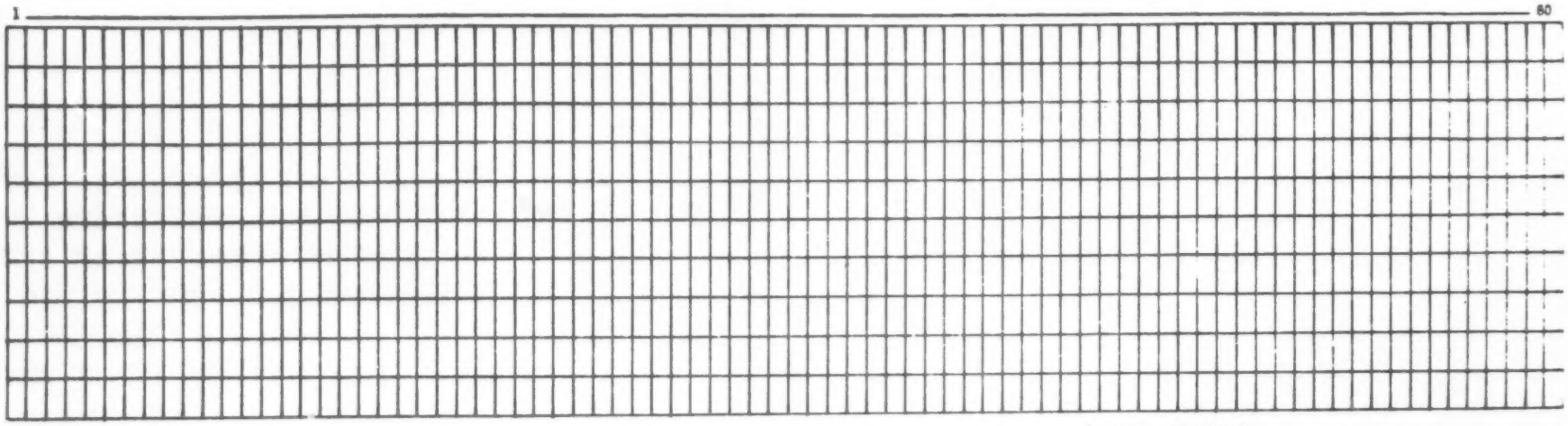
NAME RF

CARD NO. 10 (NOT USED)

((IBL(I,J),I=1,M-1),J=1,N-1) (NOT READ IF IBLA=NOBLANKING)



(FREE FORMAT)

MEG2560 - OPTION CARDS

VERSION NO. 1
JULY, 1982

DATE 14-10-82
PAGE 5 OF 5
NAME RF

EXECUTION

```
H2560,CM170000,T400,IO400,HD1,P2.
ACCOUNT,XXXXX.
ATTACH,PROCD,MEGEXECCADD,ID=MEGPR,PW=XXXX,MR=1.
BEGIN,GEM,PROCD,PROGRAMIN=MEG2560,
PFNI=MEG2300DATATEST1(PERMANENT FILE NAME INPUT FILE)
Q4= 3 ,Q5= 3 ,Q6= 3 ,Q7= 1 ,Q8=400 .
```

```
      PROGRAM GEM2560(INPUT,OUTPUT,TAPE6=OUTPUT,TAPE1,TAPE2,
     -                TAPE25,TAPE29,TAPE28,TAPE7)
      DIMENSION P(40,40),Q(40,40),GG1(40),
     -          S(40,40),GP(40,40),GY2(40),GZ1(40),
     -          GZ2(40),GG2(40),GX1(40),GY1(40),XC(40)
      DIMENSION A(4,4),B(16),C(4,4),XD(40)
      INTEGER NUANCE(330),IBL(40,40)
C*     K4=NX NUMBER OF POINTS ALONG THE X AXIS.
      K4=40
C*     K5=NY NUMBER OF POINTS ALONG THE Y AXIS.
      K5=40
C*     K6 IS THE MAXIMUM OF K4,K5
      K6=40
C*     K8 IS THE INTERPOLATION NUMBER FOR ONE CELL IN X = (K4-1)
      K8=330
      K7=1
      CALL MEG2560(P,Q,S,GP,GY2,GZ1,GZ2,GG2,GX1,GX2,GY1,XC,XD,YX,G,
     -             GG1,A,B,C,K4,K5,K6,K7,K8,NUANCE,IBL)
      STOP
      END
```

```
COLOR*ISTART*MESSAGE

YOU HAVE CALLED FOR THE

*** A P P L I C O N   C O L O R   S Y S T E M ***

THIS IS VERSION A1  OCT 1. 1979   RUNNING ON A CDC SYSTEM

THESE PROGRAMS HAVE BEEN DEVELOPED BY
MIKAEL JERN  LUND UNIVERSITY COMPUTING CENTRE
IORIG-PARAMETER IS   2

IORIGO = 0 AND IORIGO = 1   USE SMALL PLOT AREA
IORIGO = 2 AND IORIGO = 3   USE BIG PLOT AREA


PLOT AREA IN X-DIRECTION:  853.6  MM
PLOT AREA IN Y-DIRECTION:  560.8  MM
NUMBER OF ADRESSABLE POINTS IN X-DIRECTION:  4200
NUMBER OF ADRESSABLE POINTS IN Y-DIRECTION:  2760
NUMBER OF COLOR PAGES IN CORE: 23
MAXIMUM Y-LENGTH OF A SURFACE WHICH CAN BE PLOTTED WITHOUT
HAVING TO BE BROKEN DOWN INTO PIECES  560.8  MM

COLOR*ICHCOL*MESSAGE
COLOR PARAMETER = 1
```

SECTION 1 - INPUT PARAMETERS

CARD	OPTION		DESCRIPTION
1			
	NBINTX=	8	NUMBER OF SUB-CELLS IN X FOR ONE CELL
	NBINTY=	8	NUMBER OF SUB-CELLS IN Y FOR ONE CELL
	M =	40	NUMBER OF POINT IN X DIRECTION
	N =	40	NUMBER OF POINT IN Y DIRECTION
	PESOLX=	.50	LENGTH IN X OF ONE SUB-CELL
	PESOLY=	.50	WIDTH IN Y OF ONE SUB-CELL
2	IBLA =	BLANKING	NOBLANKING =NO BLANKING CARRIED OUT BLANKING =CERTAIN RECTANGULAR REGIONS OF THE MAP ARE TO BE BLANKED OUT
2	TEXT =	"COAL MINE MAY 1982 $ "	
	SUNFA =	"KM**KM$ "	UNITY OF SURFACE REAL (IMPERIAL OR METRIC)
	DRAW =	COLOR	NOCOLOR - ONLY THE CONTOUR LINES ARE DRAWN COLOR - COLORS AND CONTOUR LINES ARE DRAW
3	OPT =	1	0 = THE USER DEFINES CONTOUR LIMIT VALUES 1 = SUBROUTINE IMAPSC GENERATES CONTOUR LIMIT VALUE
	CONTOL=	1	0 = THE CONTOUR LINES HAVE ALL THE SAME WIDTH 1 = THE CONTOUR LINES WIDTH MAY BE 0.4 OR 0.2
	TEINTE=	0	0 = SUBROUTINE IMAPSC DEFINES COLOR CODES (APPLICOR) 1 = COLORS ARE DEFINED BY THE PROGRAM 2 = COLORS ARE DEFINED BY THE USER
4	XLMAP =	435000.00	SOUTH-WEST DEPARTURE
	YLMAP =	5428000.00	SOUTH-WEST LATITUDE
	XSIZE =	40.00	LENGTH ALONG DEPARTURE OF MAP
	YSIZE =	40.00	LENGTH ALONG LATITUDE OF MAP
7	NCLZ =	30	NUMBER OF CONTOUR CLASSES LIMITS
9	TLINE=	0000000000001=101010 10100000000	

10

*COLOR*INKSCL*MESSAGE**********

THIS COLOR SCALE IS PLACED WITH ORIGIN IN (188.5, 18.0)
NUMBER OF COLORS= 31

COLOR*INKSCL*MESSAGE
(NVEC(1)): TYPE OF AXIS = 2
(1 = HORIZONTAL AXIS)
(2 = VERTICAL AXIS)
(NVEC(2)): TICK MARKS PARAMETER = -1
(0 = NO TICK MARKS, +1 = TICK MARKS ON THE POSITIVE SIDE OF THE AXIS, -1 = NEGATIVE SIDE)
(NVEC(3)): SCALE NUMBER PARAMETER = 1
(0 = NO SCALE NUMBER,X = PLOT NUMBER ON EACH XTH MARK)
NVECT(4)): TEXT AND SCALE NUMBER PARAMETER = -1
(+1 = POSITIVE SIDE OF AXIS, -1 = NEGATIVE SIDE OF AXIS)
(X,Y): START VALUE OF AXIS IN MM = 188.5   22.0
(SIZE**): LENGTH OF AXIS IN MM = 116.0
(START): START VALUE =   0.000 (D): STEP =   0.000
(STEP**4): STEP BETWEEN EACH TICK MM =   4.0
(WIDTH): WIDTH OF AXIS IN MM = .4
(SIZE**): SIZE OF SCALE NUMBER IN MM = 2.0

(ICOL(3)): COLOR OF TEXT = 7

IAXSP WAS CALLED TO SET THE FOLLOWING SPECIAL OPTIONS:

EXPONENT NUMBER: 0
THE NUMBER OF DECIMAL DIGITS : 2
THE AUTOMATIC SELECTION OF SCALE VALUES IS DELETED
YOU HAVE DEFINED THE FOLLOWING VALUES:

-.350E+01	-.300E+01	-.250E+01	-.200E+01	-.150E+01	-.100E+01	-.500E+00	.124E-13	.500E+00	.100E+01	.150E+01	.200E+01
.250E+01	.300E+01	.350E+01	.400E+01	.450E+01	.500E+01	.550E+01	.600E+01	.650E+01	.700E+01	.750E+01	.800E+01
.850E+01	.900E+01	.950E+01	.100E+02	.105E+02	.110E+02						

*END OF INKSCL MESSAGE **********

```
COLOR*ICL*MESSAGE
*THE PICTURE IS READY AND WILL NOW BE TRANSFERED TO A MAGNETIC TAPE
*NUMBER OF POLYGONS INSIDE PICTURE = ..............   46240
*NUMBER OF POLYGONS OUTSIDE PICTURE = ..............       0
*NUMBER OF LINESEGMENTS = ..........................    7135
*NUMBER OF SYMBOLS = ...............................     983
*TIME FOR POLYGON TREATMENT = ......................   60744 MS
*TIME FOR LINESEGMENTS = ...........................   15112 MS
*TIME FOR SYMBOLS = ................................    2970 MS
*TIME FOR COLOR BOX CHANGING = .....................     346 MS
*NUMBER OF COLOR BOX CHANGES = .....................      91
*NUMBER OF ACCESSES TO THE COLOR BOARS = ...........  183358
*NUMBER OF COLOR BOXES (100 * 120 CELLS) USED = ...      72
*USED AREA IN PERCENT = ............................       7
```

THE MATRIX BELOW SHOWS YOU THE USE OF THE PICTURE AREA
EACH BOX CONTAINS 100 X 120 CELLS (1 CELL =0.2 MM)

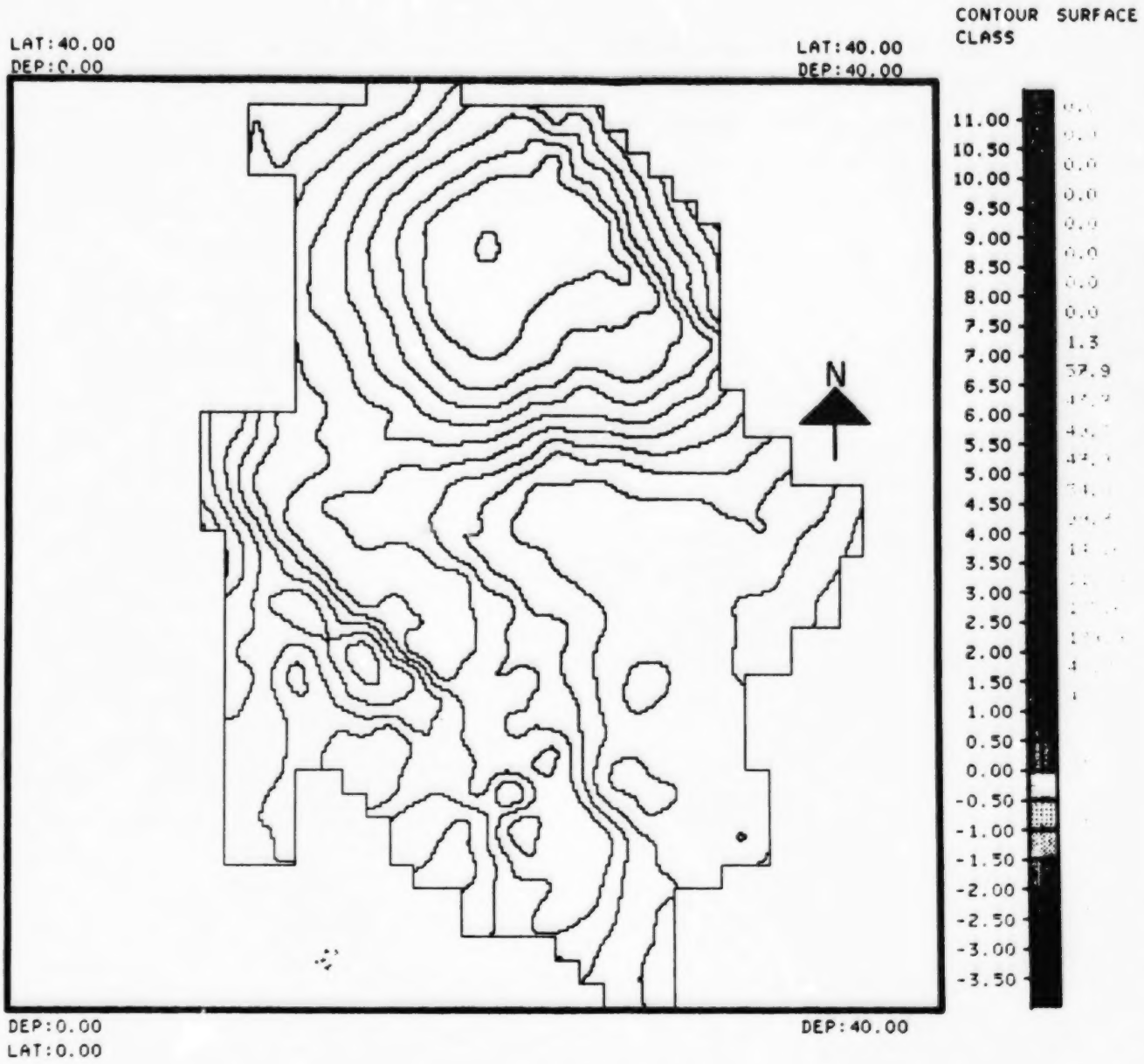
THIS PICTURE PROCESSES 1103 LINES ON THE COLOR PLOTTER

COLOR*ICLR*MESSAGE 1 PICTURE IS GENERATED

*TIME FOR TRANSFERING THE PICTURE TO A MAGNETIC TAPE = 2474 MS

*NUMBER OF ACCESSES TO DISC OR DRUM = ... 91

```
******** START OF CCLOW-JET-POSTPROCESSOR ********
**************************************************

***** NUMBER OF PICTURES GENERATED IN THIS RUN    1

********   STOP   CCLOW-JET-POSTPROCESSOR ********
**************************************************
**************************************************

***** SCANNING SPEED TO BE USED = 1

***** NUMBER OF BLOCKS TO TAPE = 1202

***** PLOTTING CHARGES AT ABOVE SPEED = $ 0.00
```


CONTOUR SURFACE CLASS
LAT:40.00
DEP:0.00
LAT:40.00
DEP:40.00
N
11.00
10.50
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
DEP:0.00
LAT:0.00
DEP:40.00

REFERENCES

1. Sabourin, R.L., "Program MEG2300 User's Guide - GEM System - CANMET Systems for mineral reserve evaluation, Version I"; Division Report ERP/MRL 82-111(TR), CANMET, Energy, Mines and Resources Canada; 1982.

APPENDIX A

CANADA CENTRE FOR MINERAL AND ENERGY TECHNOLOGY

Mining Research Laboratories

ANNOUNCEMENT

Public access to CANMET's systems for mineral reserve evaluation

---

Two computer program systems have been created by the Mine Evaluation Group (MEG) of MRL, CANMET, EMR, since 1975, for the purpose of reserves evaluation. These systems were developed principally for the evaluation of uranium reserves but can also be used to evaluate other mineral resources.

The CADD system (Coding and Analysis of Drillhole Data) is used to enter, edit and prepare basic drillhole data to be used subsequently for the evaluation of reserves. The GEM system (Geostatistical Evaluation of Mines) is a group of computer programs allowing variogram analyses and kriging estimations.

The CADD and GEM systems include twenty-five FORTRAN and COBOL computer programs which can: prepare drill log reports; calculate economical composite intersections; draw projections of drillholes on sections or plans; calculate experimental variograms; and find the best theoretical model; perform kriging evaluations as well as conventional type evaluation; and draw isocurves.

The CADD and GEM Systems for Mineral Reserve Evaluation are now available to the public on a magnetic tape at a cost of ($500) five hundred dollars (Canadian).

For more information concerning the availability of CANMET Systems for Mineral Reserve Evaluation, contact:

Mineral Technology Information Officer
Technology Information Division
CANMET
Energy, Mines and Resources Canada
555 Booth Street
Ottawa, Ontario
K1A 0G1
Telephone: (613) 995-4029

Disclaimers

1. To the best knowledge of the authors, the computer programs from the CADD and GEM systems will operate as represented but neither the authors nor CANMET give any warranty, expressed or implied, as to the completeness of the documentation, or performance of the program.

2. The computer programs from the CADD and GEM systems have been created using Control Data FORTRAN level 4.8 and COBOL level 4.7. CANMET does not guarantee that these programs can be run on any given computer without transformations.

3. The computer programs of CADD and GEM systems are protected by Crown Copyright.

LE CENTRE CANADIEN DE LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERGIE

Laboratoires de recherche minière

ANNONCE

L'accès du public aux systèmes du CANMET pour l'évaluation des réserves en minéraux

---

Depuis 1975, deux systèmes de programmes d'ordinateur ont été créés par le MEG (Mine Evaluation Group) les LRM du CANMET, ÉMR, dans le but de l'évaluation des réserves. Ces systèmes furent principalement développés pour l'évaluation des réserves d'uranium, mais ils peuvent également être utilisés pour d'autres ressources minérales.

Le système CADD (Coding and Analysis of Drillhole Data) est utilisé pour entrer, réviser et préparer des analyses de trous de forage, dans le but de les utiliser par la suite pour l'évaluation des réserves. Le système GEM (Geostatistical Evaluation of Mines) est un groupe de programmes d'ordinateur permettant d'effectuer des analyses de variogramme et des évaluations de krigeage. Les systèmes CADD et GEM comprennent vingt-cinq programmes d'ordinateur en FORTRAN et en COBOL, lesquels peuvent préparer des rapports d'inventaires de forage, faire des projections économiques, faire des projections sur les trous de forage sur des plans ou des sections, calculer des variogrammes expérimentaux, trouver le meilleur modèle théorique, effectuer des évaluations de krigeage, de même que des évaluations de type conventionnel, et dessiner des courbes de niveau.

Les systèmes CADD et GEM pour l'évaluation des ressources minérales sont maintenant disponibles au public sur ruban magnétique, pour la somme de cinq cents dollars ($500), en argent canadien.

Pour de plus amples renseignements concernant les systèmes du CANMET pour l'évaluation des réserves minérales, veuillez communiquer avec:

L'agent d'information sur la technologie minière
Division de l'information technologique
CANMET
Energie, Mines et Ressources, Canada
555, rue Booth
Ottawa (Ontario)
K1A 0G1
Téléphone: (613) 995-4029

Dénis de responsabilité

1. Au meilleur de la connaissance des auteurs, les programmes d'ordinateur des systèmes CADD et GEM opéreront comme ils sont présentés, mais ni les auteurs, ni le CANMET n'offrent de garantie, expressément ou implicitement, quant à l'état complet de la documentation ou à la performance du programme.

2. Les programmes d'ordinateur des systèmes CADD et GEM sont écrits en FORTRAN (CDC, Level 4.8) et COBOL (CDC, Level 4.7). Le CANMET ne garantit pas que ces programmes peuvent être passés sur n'importe quel ordinateur sans effectuer des transformations.

3. Les programmes d'ordinateur de systèmes CADD et GEM sont protégés en vertu du droit d'auteur de la Couronne.